


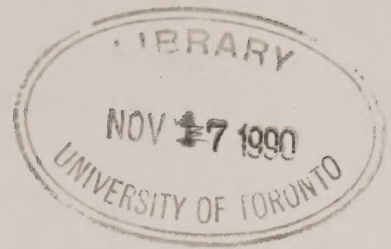
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HEARING BY THE FEDERAL ENVIRONMENTAL ASSESSMENT
REVIEW OFFICE ON NUCLEAR FUEL WASTE MANAGEMENT.

SCOPING MEETING

Hearing held at the St. Lawrence Hall,
King Street East, 3rd Floor, Toronto,
Ontario, on Monday, October 22, 1990,
commencing at 2:00 p.m.

VOLUME I

B E F O R E :

MR. BLAIR SEABORN

CHAIRMAN

DR. WILLIAM FYFE

MEMBER

MS. LOUISE ROY

MEMBER

DR. LOIS WILSON

MEMBER

DR. LOUIS LAPIERRE

MEMBER

DR. LIONEL REESE

MEMBER

MR. PIETER van VLIET

MEMBER

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FEDERAL ENVIRONMENTAL
ASSESSMENT REVIEW
OFFICE

BUREAU FEDERAL
D'EXAMEN DES EVALUATIONS
ENVIRONNEMENTALES

Held at: St. Lawrence Hall
Toronto, Ontario

Date: Monday, October 22, 1990

Volume No.: I
(afternoon session)

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DR. WILLIAM FYFE	MEMBER
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DR. LOIS WILSON	MEMBER
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DR. LIONEL REESE	MEMBER
MR. PIETER van VLIET	MEMBER

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A P P E A R A N C E S

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DR. DAVID TORGERSON

Atomic Energy of Canada
Limited

6

DR. RAYMOND PRICE

Scientific Review Group

7

DR. B. S. SHUKLA

Shukla & Associates

8

DR. IAN ROWE

Spar Aerospace

9

MR. DAVID PASCOE

Environment Canada

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1 ---Upon commencing at 2:00 p.m.

2 THE CHAIRMAN: Ladies and gentlemen, my
3 watch tells me it is close to two o'clock or perhaps a
4 little bit before, so I would like to get the meeting
5 under way.

6 Good afternoon to you and welcome to the
7 Scoping Meetings of the Environmental Assessment Panel
8 which is being asked to review the Nuclear Fuel Waste
9 Management and Disposal Concept.

10 The Panel was appointed by the Ministry of
11 the Environment in October of 1989. Could I introduce
12 the Members of the Panel who are here. To your left and
13 my right, Dr. William Fyfe, professor in the Department
14 of Geology and Dean of the Faculty of Science at the
15 University of Western Ontario.

16 Next to him is Ms. Louise Roy, an
17 Environmental and Public Affairs Consultant residing in
18 Montreal. Ms. Roy is is currently Vice-President of the
19 Quebec Foundation of the Environment and a Member of the
20 Canadian Environmental Assessment Research Council.

21 To my immediate right, Dr. Lois Wilson,
22 President of the World Council of Churches and
23 Co-director of the Ecumenical Forum of Canada in
24 Toronto.

25 To the far left of the table, Dr. Louis



1 Lapierre, a professor in the Department of Biology at
2 the University of Moncton and Chairman there of the
3 Environmental Council of New Brunswick.

4 And next to him, Dr. Lionel Reese, a
5 physician at St. Joseph's Hospital in London, Ontario,
6 professor in the Department of Diagnostic Radiology and
7 Nuclear Medicine at the University of Western Ontario.

8 We are missing, but I hope he will arrive
9 shortly, Mr. Pieter van Vliet, mechanical engineer in
10 Regina who is a member of the Senate at the University
11 of Regina.

12 My name is Blair Seaborn, I am Chairman of
13 the Panel and I reside in Ottawa. I have retired from
14 public service but previously I served as Deputy
15 Minister of the Environment and Canadian Chairman of the
16 International Joint Commission.

17 I would also like to introduce the Panel
18 Secretariat: Mr. Bob Greyell, the Executive Secretary
19 who is on the table immediately to the left of where we
20 sit. And somewhere, no doubt floating at the back of
21 the room, is Susan Tuller, an environmental analyst who
22 is assisting the Panel and who will be sitting at a
23 table somewhere back there. Either of those members
24 will be glad to provide any information you may need
25 regarding this review.



1 The review is being conducted in
2 accordance with the Federal Environmental Assessment and
3 Review Process or EARP as it is rather inelegantly
4 known.

5 This process insures that the
6 environmental implications of proposals for which the
7 Federal Government has decision making authority are
8 fully considered as early in the planning process as
9 possible and before irrevocable decisions are taken. I
10 hope that some of you may have had the opportunity to
11 receive information on this review process and on the
12 proposal of Atomic Energy of Canada Limited, AECL, at
13 the open houses which were held in May and June of this
14 year.

15 The Panel has been asked in part to
16 examine the Nuclear Fuel Waste Management and Disposal
17 Concept which is a proposal for permanent disposal of
18 used nuclear fuel deep in the granitic rock of the
19 Canadian Shield. This proposal would see the used fuel
20 stored inside corrosion resistant containers, placed in
21 holes drilled in the floor of a room inside a deep
22 disposal vault. The vault would in some ways resemble a
23 deep mine and would contain the used fuel in an area of
24 approximately four square kilometres.

25 Mr. Peter van Vliet has arrived to join



1 us. I described who he was.

2 I would like to say a few words about the
3 Panel's mandate. The terms of reference state that the
4 Panel is to review the safety and acceptability of the
5 concept for-geological disposal of nuclear fuel wastes
6 in Canada as proposed by Atomic Energy of Canada.
7 Additionally, a broad range of nuclear fuel waste
8 management issues including long-term management,
9 transport and environmental, social and economic effects
10 are included in this review.

11 Since site selection will not occur until
12 the disposal concept has been accepted as safe, the
13 Panel will not consider any specific sites but will
14 review the potential availability of sites and the
15 methodology required for site characterization.

16 I would also like to say a few words about
17 what is not in the Panel's mandate date and will not be
18 addressed in this review.

19 First, the energy policies of Canada and
20 the provinces.

21 Second, the role of nuclear energy within
22 these policies including the construction, operation and
23 safety of new or existing nuclear power plants. Fuel
24 repossessing as an energy policy and the military
25 applications of nuclear technology. These are not



1 within our mandate and therefore will not be addressed
2 by us.

3 Let me be clear, however, that this Panel,
4 its individual members collectively, are of course very
5 much aware of the broader concerns related to the use of
6 nuclear materials. I understand that discussions are
7 progressing well between the Departments of Energy and
8 the Environment, the Federal departments concerning a
9 broad review of the health and environmental
10 implications of the various methods of generating
11 electricity. I hope that these discussions will soon
12 result in getting that review under way.

13 The purpose of scoping meetings such as
14 this one is to allow participants to identify issues
15 that need to be addressed in the Environmental Impact
16 Statement that will be prepared by AECL. The Panel is
17 not requesting the presentation of opinions on the
18 substance of the disposal concept at this time. Public
19 hearings will be held later to discuss whether AECL's
20 proposal is acceptable. These scoping meetings enable
21 participants to assist this panel in identifying issues
22 that are of concern and questions which in all our minds
23 need answers.

24 Following this series of meetings which
25 will take place over the next four to five weeks, the



1 Panel will be preparing draft guidelines for the
2 preparation of the Environmental Impact Statement of
3 AECL. We shall invite public comments on these draft
4 guidelines over a period of 30 days. And after
5 consideration of these comments, the Panel will finalize
6 the guidelines and issue them to AECL which will proceed
7 to draft its paper. That process I will not pin, that
8 second part of that process, the AECL work, I cannot pin
9 in time. It will be their responsibility. My guess is
10 that it will be a year to a year and a half that they
11 will need to prepare that document.

12 When AECL has completed that Impact
13 Statement and submitted it to the Panel, it will in turn
14 be made available for a 90-day public review. To assist
15 in the evaluation of scientific and technical matters, a
16 Scientific Review Group of distinguished independent
17 experts has been established by the Panel to examine the
18 safety and scientific acceptability of AECL's disposal
19 concept. A report of their findings and recommendations
20 will be submitted the the Panel who will in turn
21 distribute it to the public.

22 Once the Panel is satisfied that AECL has
23 addressed satisfactorily all the items identified in the
24 guidelines, we will hold public hearings. Participants
25 will at that stage be asked to discuss the acceptability



1 or otherwise of AECL's disposal concept in detail. The
2 Panel will consider all comments submitted to it and
3 will prepare its report to the Ministers of the
4 Environment and of Energy, Mines and Resources. The
5 present scoping meetings will be conducted according to
6 the Meeting Procedures published on August 24th, made
7 available by press release on August 24th of this year.

8 The Panel would appreciate it if review
9 participants would restrict themselves to the
10 identification of issues within the Panel's mandate. I
11 ask that those registered to speak attempt to summarize
12 their concerns in 15 minutes unless they have previously
13 requested an additional 10 minutes of time. The Panel
14 will pay equal attention to written and oral statements.

15 Participants who have registered in
16 advance will be asked to present their views to the
17 Panel. Panel members may ask questions of clarification
18 following each presentation. Anyone who would like to
19 make a presentation to the Panel but has not registered
20 may speak to either member of the Panel's secretariat,
21 Mr. Greyell or Ms. Tuller now or at a coffee break which
22 will be announces midway through this afternoon's
23 proceedings. We will do our best to accommodate those
24 who have not already registered, but of course this may
25 depend on the time remaining at the end of the meeting.



1 Court-reporters will record the
2 proceedings of each meeting and transcripts will be made
3 available to designated libraries. A compilation of
4 written submissions will also be available from the
5 Federal Environmental Assessment Review Office in
6 Ottawa.

7 The Panel will, in addition, accept
8 written submissions identifying issues and concerns up
9 until November 30th of 1990.

10 With this by way of introduction, I would
11 like to call now on our first intervenor and speaker for
12 the afternoon, Dr. David Torgerson of Atomic Energy of
13 Canada Limited. Dr. Torgerson?

14 PRESENTATION BY DR. TORGERSON:

15 Mr. Chairman, distinguished Members of the
16 Panel, ladies and gentlemen.

17 Thank you for the opportunity to present
18 the proponent's perspective at the start of this review.
19 There is no doubt that the task you are undertaking is
20 important for Canada. The Honourable Marcel Masse, who
21 was Minister of Energy, Mines and Resources Canada when
22 the concept for nuclear fuel waste disposal was referred
23 for environmental review, said: "It will be one of the
24 most important environmental assessments ever carried
25 out in Canada."



1 AECL believes that carefully engineered
2 and controlled burial 500 to 1000 meters deep in the
3 massive rock body of the Canadian Shield is a safe way
4 to dispose of Canada's nuclear fuel waste. This belief
5 is based on 13 years of intensive research and
6 development. During this 13 years, the concept has been
7 tested against all aspects of scientific questioning and
8 engineering feasibility that have been raised, either by
9 our own scientists and engineers or by technical experts
10 external to AECL. Although there is, as yet, no
11 proposal for an actual disposal project, AECL is
12 submitting this disposal concept for review at this time
13 to determine whether it is acceptable to Canada.

14 There is international consensus that
15 nuclear fuel waste should be disposed of safely, without
16 any remedial measures being required by future
17 generations who did not benefit from the power generated
18 when this waste was produced. In Canada, the need to
19 develop a concept for permanent disposal of nuclear fuel
20 wastes that is acceptable both technologically and in
21 terms of safety, and at that same time is acceptable to
22 the public from the overall social, political and
23 economic perspective has been emphasized by various
24 commissions. These include the EMR committee chaired by
25 Dr. Kenneth Hare, the Ontario Hydro study by Dr. Robert



1 Uffen, and the Ontario Royal Commission on Electrical
2 Power Planning chaired by Dr. Arthur Porter, all in the
3 mid- to late 1970s.

4 Our submission is being made in accordance
5 with the mandate given to AECL by the Joint Statements
6 of the Canadian and Ontario governments in 1978 and
7 1981.

8 I would like to briefly review the AECL
9 mandate in the context in which it was given, because it
10 may help to understand the scope of the AECL work to
11 date and the perspective that AECL has on this review.

12 In 1976, Ontario Hydro provided a one-year
13 research grant to Dr. Robert Uffen, then Dean of Applied
14 Science at Queen's University to study waste disposal
15 options. He concluded that the preferred disposal
16 option was deep burial in stable geologic areas such as
17 the Canadian Shield.

18 In 1977, the Federal Department of Energy,
19 Mines and Resources commissioned an independent expert
20 group chaired by professor Kenneth Hare, then Head of
21 the Institute of Environmental Studies at the University
22 of Toronto, to, "Carry out a study on the safe long-term
23 storage of radioactive waste and to submit a report to
24 the government and the public of Canada."

25 The Hare Commission considered various



1 options for disposal of nuclear fuel waste, including
2 surface storage, burial in ice sheets, disposal in outer
3 space, disposal on or under the deep seabed, and
4 geologic disposal on land. It recommended that the
5 Federal Government fund the development of the
6 technology for disposal and stated that, "Of the various
7 options for disposal of...irradiated fuel, we consider
8 underground disposal in geologic formations to be the
9 most promising within Canada. Igneous rocks are
10 preferred..." The report went on to note that, "The
11 Precambrian Shield of Canada...contains large amounts of
12 such rock... The fact that the Shield has been stable
13 for hundreds of millions of years is a sure indication
14 that it will continue to remain stable for further
15 millions of years. We can say this with confidence for
16 it takes millions of years for the geologic regime to
17 change from stable to active."

18 The Ontario Royal Commission on Electric
19 Power Planning had begun hearings in 1975, and in 1977
20 turned its attention to the issues surrounding nuclear
21 power, including the long-term management of used
22 nuclear fuel. In an interim report to the Ontario
23 Government in 1978, the Commission, chaired by Dr.
24 Arthur Porter, endorsed the Hare and Uffen
25 recommendations, urging that disposal in the rock of the



1 Canadian Shield be pursued. The Commission's interim
2 report, entitled "A Race Against Time," and suggested
3 that, if substantial progress in used fuel disposal
4 research and development was not made by 1985, a
5 moratorium on new nuclear construction might be
6 justified. This deadline was extended to 1990 in the
7 Commission's final report. (Dr. Porter has since been
8 quoted as saying that he feels the requirement has been
9 satisfied.)

10 In 1978, the Governments of Canada and
11 Ontario issued a joint statement establishing the
12 Canadian Nuclear Fuel Waste Management Program. The two
13 governments agreed to share responsibility for
14 developing the technology to dispose of radioactive
15 waste from CANDU reactors and agreed that they would
16 pursue the option of disposal of plutonic rock in the
17 Canadian Shield. The work was divided as follows:

18 - The Federal Government, through AECL,
19 would develop the technology for
20 immobilization and disposal of used fuel
21 waste, and

22 - The Ontario Government, through
23 Ontario Hydro, would be responsible for
24 developing the technology for interim
25 storage and transportation of used nuclear



1 fuel.

2 As a result of the Joint Statement, AECL
3 began a field research program at Chalk River,
4 Whiteshell, Atikokan, White Lake, and several other
5 locations to determine the characteristics of plutonic
6 rock in the Canadian Shield.

7 In April of 1981, the Federal Government
8 approved, in principle, a 10-year research and
9 development program to provide the data necessary to
10 assess the concept of deep underground disposal.

11 In August of 1981, the Governments issued
12 a second joint statement. This joint statement
13 announced that, "no disposal site-selection will be
14 undertaken until after the concept has been accepted."
15 It also said that the "concept assessment" phase of the
16 program would be separated from a future site-selection
17 phase by a "regulatory and environmental review, a full
18 public hearing, and a decision by the two governments on
19 the acceptability of the concept.

20 It is this background that has determined
21 the scope of the Canadian Nuclear Fuel Waste Management
22 Program. The research has been intensive. The in-depth
23 scientific evidence necessary to support the concept has
24 required world class research in the areas of fuel
25 characterization and waste forms, container technology



1 and corrosion, sealing technology, geosciences,
2 environmental sciences and mathematical modelling.
3 The technical depth of the program is illustrated by the
4 plan that AECL has developed a major centre for
5 geotechnical research, including our Underground
6 Research Laboratory. This is the only underground
7 laboratory in the world developed in a rock formation
8 not previously disturbed by mining or other activities.
9 Also of note is our pioneering work in probabilistic
10 modelling reflected in the development of the Systems
11 Variability Assessment Computer Code (SYVAC). More than
12 1000 scientific papers have been published describing
13 our research.

14 The participation of Ontario Hydro in this
15 research has been significant. Ontario Hydro has been
16 responsible for the technical work on preclosure
17 assessment, the portion of assessment dealing with
18 impacts during the construction and operation of a
19 disposal facility, including the impacts of
20 transportation. Also, Ontario Hydro has participated in
21 the funding of the research and development program, and
22 has contributed expertise and facilities through a
23 technical assistance program to AECL.

24 Although the research is diverse
25 (involving geosciences, environmental sciences, physics,



1 chemistry, mathematice, metallurgy, engineering, and the
2 social sciences), it has been integrated to focus on the
3 concept of burial deep in the plutonic rock of the
4 Canadian Shield. Consideration of other disposal media
5 has been outside the mandate given to AECL and has not
6 been included in its specific research program; however,
7 the question of alternative disposal media has been
8 addressed by monitoring the research programs of other
9 countries and by reviewing existing information on salt
10 and sedimentary formations in Canada.

11 I would now like to present AECL's
12 perspective on the scope of this review, and to comment
13 on the means by which AECL might assist the Panel in
14 carrying out its assigned tasks.

15 The Panel's Terms of Reference ask it to
16 prepare a report for the Ministers of Environment and
17 Energy, Mines and Resources, addressing two basic
18 questions:

- 19 a) Whether AECL's concept for geologic
20 disposal of nuclear fuel wastes is safe
21 and acceptable, or should be modified;
22 and,
23 b) the future steps to be taken in the
24 management of nuclear fuel wastes in
25 Canada.



1 The Terms of Reference establish a
2 constructive process for reviewing the AECL concept by
3 providing the Panel and the public with the opportunity
4 to assess the acceptability of AECL's concept, or to
5 advise whether modifications are necessary.

6 Let me first deal with the question of the
7 acceptability of AECL's concept. AECL was directed by
8 the Governments of Canada and Ontario to investigate the
9 plutonic rock of the Canadian Shield because of its
10 appropriateness for Canada. We believe we have the
11 scientific evidence to show that this concept represents
12 an option for Canada that is safe, economic, practical
13 and feasible with present-day technology. We are not
14 alone in this belief. In Sweden and Switzerland,
15 similar concepts have already been submitted for review
16 and have been accepted by the governments of those
17 countries.

18 The Panel's Terms of Reference ask it to
19 "become fully aware of the programs of other leading
20 countries in this field, in particular, those countries'
21 consideration of different geologic media and their
22 development of appropriate plans and schedules for
23 siting and construction of nuclear fuel waste management
24 facilities." Other countries are investigating
25 geologies most appropriate to their circumstances just



1 as Canada is investigating the Canadian Shield which
2 offers the greatest flexibility for implementation in
3 our country. AECL is prepared to provide information
4 about other countries' nuclear fuel waste management
5 programs in order to help the Panel assess whether
6 AECL's investigation of the Canadian concept is
7 consistent with those followed elsewhere.

8 We commend the Panel for appointing a
9 group of well-qualified scientists and engineers to its
10 scientific Review Group. This group will have the
11 important task of determining from a technical
12 perspective the safety and scientific acceptability of
13 the concept.

14 The Panel has been asked the criteria by
15 which the safety and acceptability of the concept will
16 be evaluated. The Atomic Energy Control Board has
17 published regulatory criteria in Regulatory Documents
18 R-71, R-72 and R-104. These documents have guided AECL
19 in its assessment of the disposal concept, and we
20 suggest that they form a corner stone for deliberations
21 on this issue. In comparing these criteria with those
22 of other energy and industrial wastes, the Panel may
23 encounter some difficulties because of the multiplicity
24 of criteria and standards associated with these
25 different sources. AECL can provide assistance in this



1 regard.

2 I would now like to turn to the question
3 of future steps in managing Canada's nuclear fuel waste.
4 AECL maintains that the technology is in place to
5 implement the concept. However, it is our view that the
6 Panel needs to look at the broad picture of requirements
7 and timing, considering the degree to which we should
8 relieve future generations of the burden of looking
9 after the wastes. The demonstrated safety of current
10 storage methods provides us with the a luxury of taking
11 the time to do the job right...

12 ---Interruption:

13 MS. ARMSTRONG: We are here to tell the
14 Panel that we are boycotting this process. This is
15 nothing more than a public relations exercise to get
16 Canadians to accept the concept of nuclear waste and
17 more nuclear power. This process is not democratic,
18 there is no discussion of nuclear power and we are going
19 to continue to boycott it.

20 THE CHAIRMAN: Thank you. Continue your
21 presentation.

22 DR. TORGERSON: Perhaps I'll just repeat
23 what I think is an important comment.

24 It is our view that the Panel needs to
25 look at the broad picture of requirements and timing



1 considering the degree to which we should relieve future
2 generations of the burden of looking after the wastes.
3 The demonstrated safety of current storage methods
4 provide us with the luxury of taking the time to do the
5 job right. However, it is important to consider now the
6 question of implementation. Even under the most
7 optimistic scheduling assumptions, if siting began
8 immediately, disposal would not start until about 20
9 years from now.

10 It is worthwhile to note that the
11 establishment of a safe and secure method of permanently
12 disposing of Canada's nuclear fuel waste is independent
13 of any future expansion or decrease in nuclear
14 electricity generation. The wastes exist today and
15 continue to be produced by existing nuclear power
16 stations.

17 I would now like to turn to the question
18 of AECL's submissions.

19 The primary objective of AECL throughout
20 its research program has been to develop and assess the
21 concept of burial of nuclear fuel waste deep in the
22 plutonic rock of the Canadian Shield. It is our intent,
23 for this environmental review, to demonstrate that an
24 acceptable concept exists. To do this, AECL intends to
25 present comprehensive scientific evidence to the Panel



1 to show that:

- 2 1. Criteria exist to define safe disposal;
- 3 2. the technology exists now to site, design,
4 construct, and operate a disposal facility
5 that meets the safety and environmental
6 criteria;
- 7 3. the methodology exists to evaluate the
8 performance of a disposal facility in
9 plutonic rock in terms of the safety and
10 environmental criteria; and.
- 11 4. many potential suitable rock formations
12 are available in the Canadian Shield.

13 Specifically, we intend to describe the
14 concept for disposal of nuclear fuel waste and the
15 technology that will be required to implement the
16 concept. We will present our overall evaluation of the
17 concept and the scientific basis for our conclusion that
18 disposal based on this concept is feasible and would be
19 safe.

20 We will illustrate how the concept could
21 be implemented by describing a conceptual disposal
22 facility design based on a set of reference
23 specifications. The design uses currently available
24 technology or easily achievable extensions to current
25 technology. We will provide cost estimates based on



1
2 this design and an evaluation of its engineering
3 feasibility.

4 We will describe the technology used in
5 the conceptual design as well as a range of alternative
6 design options that have been investigated, including
7 different waste forms, containers, seals and other
8 engineered barriers in the disposal system. We will
9 also explain the technology developed for siting in
10 plutonic rock, and the methodology for obtaining the
11 geotechnical and the environmental information needed
12 for designing a disposal system and assessing its
13 environmental impact.

14 The description of the scientific basis
15 for our conclusions will include analysis of both the
16 operational phase of the disposal facility, called the
17 preclosure assessment, and the long-term environmental
18 impact and safety following its closure, the postclosure
19 assessment.

20 The preclosure assessment will provide an
21 evaluation of the environmental, social and economic
22 impacts associated with the transportation of the waste
23 and with the construction, operation and decommissioning
24 of a disposal facility. It will use the conceptual
25 disposal facility design as the basis for the
26 evaluation.
27
28



1 The postclosure assessment will analyze
2 the long-term impact and safety of a disposal facility
3 following its closure. It will explain and demonstrate
4 the technology developed to perform the environmental
5 and safety assessment, and will provide a major
6 component of the evidence that the proposed concept
7 represents a sound method for safely disposing of the
8 waste.

9 In addition to the postclosure assessment,
10 we will provide the scientific information used in the
11 computer analyses of the long-term environmental impact.
12 We will provide the assumptions and the data for the
13 processes occurring in the underground vault, (that is,
14 within and near the disposal containers), the geosphere
15 (the rock formation), and the biosphere (the
16 near-surface and surface environment).

17 In summary, the central question of the
18 review is the acceptability and safety of the disposal
19 concept. AECL was given a mandate to develop the
20 concept of deep burial in the plutonic rock of the
21 Canadian Shield and present it for full public review.
22 Our 13 years of intensive research has provided us with
23 confidence in the safety of such disposal. We look
24 forward to an intensive review from the Canadian
25 perspective. Thank you very much.



1 THE CHAIRMAN: Thank you, Dr. Torgerson.
2 I would ask whether any of the Members of the Panel
3 would wish to put any questions to the representative of
4 AECL on the presentation which has been made in order to
5 elaborate or to clarify any points there.

6 Dr. Wilson.

7 DR. WILSON: Thank you for the
8 presentation. I am pleased on the last page you said:

9 In summary, the central question of the
10 review is the acceptability and safety of
11 the disposal concept.

12 And I would like some clarification about
13 "acceptability and safety". Since the Panel is charged
14 with that central question of the safety, I would be
15 helped by Atomic Energy of Canada if it is your plan to,
16 in your data that you give to us, to present the risks
17 that are attendant upon this because everything is --
18 nothing is without risk and so I would -- that is one
19 question because I am not a scientist particularly.

20 The second thing is in terms of the
21 acceptability and the public acceptability, you have
22 mentioned social, economic and political acceptability.
23 I am wondering if you are also going to address ethical
24 responsibility in terms of our relationship to the
25 created order.



1 DR. TORGERSON: All right. I think my
2 first question related to risk because as you say, no
3 human activity is devoid of risk. The next breath of
4 air we take is a risk. It may have a pathogen in it
5 that will eventually do us in. But the risk, the
6 criteria for the safety is being set by the Atomic
7 Energy Control Board. Now, this I believe there will be
8 a presentation later by the Atomic Energy Control Board.

9 AECL's mandate is to meet those criteria
10 and so perhaps it would be best if you discussed the
11 safety and the risk of the concept with those people
12 rather than with me.

13 AECL will simply follow whatever safety
14 criteria is set by the AECB or any other outside agency.
15 We are then required to develop the technology to meet
16 that target.

17 In terms of the ethics of nuclear waste
18 disposal, I will tell you what mine are. I think, as I
19 have mentioned in my talk, I think it is extremely
20 important that this generation, since we are benefitting
21 from nuclear power, over 50 per cent of the power in the
22 province is nuclear, since we are getting the benefits,
23 this generation has to solve the problem of what to do
24 with the nuclear waste. And so the ethics of the
25 situation to me are very simple. We have got to get on



1 with the job and we have got to come to grips with this
2 problem in our generation.

3 That is my own personal view on the ethics
4 of the situation.

5 THE CHAIRMAN: Ms. Roy?

6 MS. ROY: Following this question, will
7 your presentation include a risk analysis related to
8 meeting the criteria posed by AECL, Atomic Energy of
9 Canada, the Control Board, sorry?

10 DR. TORGERSON: Yes, we are devising, for
11 the Panel's consideration, we are devising a reference
12 waste vault in which we will do a complete safety
13 analysis of that reference vault. We will be presenting
14 that for scientific and public review. So, yes.

15 THE CHAIRMAN: Dr. van Vliet.

16 DR. van VLIET: Dr. Torgerson, in your
17 assesments of the effects on the long-term you are using
18 computer models. To what extent have these computer
19 models been tested to the extent as far in the future as
20 we would wish that it was conceivable thousands of years
21 based on the 13 years of experience?

22 DR. TORGERSON: Well, of course, no one
23 can walk into the future and predictive models are able
24 to -- you are able to predict what happens in the future
25 if in fact the models are predicated on good solid



1 science. And we think that they are predicated on very
2 good solid science and we think that is going to come
3 out of the scientific review of our work.

4 However, of course, we can go back
5 although we can't go forward in time, we can go back in
6 time and look at our understanding of how nature has
7 tied up similar wastes. For example, we have deposits
8 in Canada that have been stable for over a billion years
9 and we can use our knowledge and our technology to try
10 to explain why that has occurred. And in doing so, we
11 gain confidence that the technology and science that we
12 have that are the basis for the predictive models we are
13 using are in fact on very solid ground. So we will show
14 all this of course in our submission to the Panel.

15 DR. van VLIET: To what extent have these
16 computer models been tested for the long-term?

17 DR. TORGERSON: Well, could you clarify
18 that question, I'm sorry, to what extent they have been
19 tested for the long-term?

20 DR. van VLIET: To what extent, yes.

21 DR. TORGERSON: That the models are
22 predicated of course on experimental work that is
23 ongoing in the laboratory. In some cases, let me just
24 take the example of corrosion of the containers that
25 will contain the fuel, we had to accelerate the



1 corrosion process using electrochemical techniques. That
2 way we have been able to look at what will happen in the
3 far future and develop conservative or pessimistic
4 models from that research and put it into our computer
5 models.

6 So to the extent that it is possible, this
7 is what we have done.

8 THE CHAIRMAN: Mr. Lapierre.

9 DR. LAPIERRE: Have you looked at the
10 feasibility of reprocessing the fuel rather than
11 disposing of it?

12 DR. TORGERSON: Let me say that whether
13 you reprocess fuel or do not reprocess fuel does not
14 really matter from the disposal concept because you are
15 not increasing nor decreasing the amount of
16 radioactivity by reprocessing. Radioactivity is still
17 there. So whether the fuel is reprocessed or not
18 reprocessed, you still need to have permanent disposal
19 of the radioactive waste. We in Canada do not have a
20 fuel reprocessing program at this time and so our
21 reference material for disposal is the nuclear fuel
22 itself.

23 THE CHAIRMAN: Any other questions? If
24 not, Dr. Torgerson, thank you very much indeed for that
25 presentation and we shall certainly be studying your



1 remarks as well, thank you.

2 DR. TORGERSON: Thank you.

3 ---Dr. Torgerson withdraws

4 THE CHAIRMAN: I would like to call next
5 on Dr. Raymond Price of Queen's University who is the
6 Chairman of the Scientific Review Group which is
7 assisting the Panel to which I made reference in my
8 opening remarks. Dr. Price.

9 PRESENTATION BY DR. PRICE:

10 Thank you, Mr. Chairman.

11 The Scientific Review Group is responsible
12 for advising the Panel on the technical and scientific
13 aspects of the proposal and in the context of this
14 scoping session and in the development of guidelines for
15 an Environmental Impact Statement, we are today
16 presenting some preliminary recommendations.

17 It is our plan to produce a final report
18 on the 22nd of November at the scoping session in
19 Winnipeg. But we hope at this time to indicate the
20 direction of our thinking on this task. I think the
21 first question that we would like to pose is a very
22 general one and that is what are the standards of
23 acceptability for a high level nuclear waste disposal
24 system and how are they established?

25 We think that there are broad issues in



1 terms of environmental impacts that need to be
2 addressed. What changes in the natural environment in
3 the biosphere, the atmosphere, the hydrosphere and in
4 the geosphere of the rocks themselves may be expected as
5 a result of the construction of the facility, the
6 loading of the facility, and the subsequent operation of
7 this high level nuclear waste repository. And how
8 significant will these changes be locally and
9 regionally.

10 We think that it is necessary to break
11 down the analysis of the environmental impacts into
12 components; what are the potential environmental impacts
13 of the transportation of the high level nuclear wastes
14 to the site.

15 What are the potential environmental
16 impacts of the actual construction of a facility.

17 What environmental impacts may arise as a
18 result of the loading of the repository.

19 And finally, what are the potential
20 environmental impacts after loading of the waste
21 repository.

22 In addressing these, it is necessary to
23 consider the question of how information from field
24 studies, models, various analogues and scientific and
25 technical experience are assembled and used to develop



1 predictions of environmental impacts. And how they are
2 used to determine the reliability and confidence limits
3 of these predictions.

4 We would ask what systematic processes are
5 used to identify and account for the effects of
6 progressive long-term changes in the geosphere and
7 biosphere and in human society. What impact this has on
8 the operation of the waste repository.

9 We would ask what criteria, what theories,
10 what models can be used to assess and rank the
11 environmental impacts in terms of their risks for
12 natural ecosystems and for humans.

13 In terms of the proposed concept, one
14 fundamental question is, what are the essential
15 attributes of the proposed concept. What are the
16 specifics of the multiple barrier approach. What is the
17 duration of the effectiveness of the facility. What are
18 the desirable attributes of a site, what provisions are
19 there for future changes in reactor technology and waste
20 characteristics, for future changes in desirability of
21 waste reprocessing, future changes in our understanding
22 of nuclear waste hazards and of the geosphere and of the
23 biosphere.

24 What provisions are there for surprises
25 such as earthquakes, meteorite impacts, terrorism, armed



1 conflicts. What provision is there for high level
2 nuclear waste generated after a repository is sealed.
3 Have alternative solutions been adequately analyzed.

4 What is the justification for choosing
5 permanent disposal over perpetual care, whether at the
6 surface or in the subsurface. What is the justification
7 for choosing plutonic rocks of the Canadian Shield
8 versus other geological environments, salt, shale,
9 seabed sediments or glacier ice.

10 What is the justification for choosing
11 geological disposal over other types of disposal. Why
12 the commitment to a centralized facility instead of
13 dispersed facilities.

14 We have some questions regarding the
15 baseline environment and by this we mean the natural
16 environment as it exists without the effects of the
17 construction and operation of a nuclear waste
18 repository. The total environment, the biosphere, the
19 atmosphere, the hydrosphere because this represents the
20 baseline against which all environmental impacts are
21 measured.

22 We think that there should be answers to
23 the question, what are the relevant attributes of the
24 baseline environment in the surface and in the
25 subsurface. What critical parameters can be used to



1 characterize these relevant attributes. What are the
2 ranges and limits of these parameters. How are these
3 parameters linked to each other.

4 What long-term changes, independent of the
5 establishment of a waste repository, can be expected in
6 these baseline parameters. The environment is changing
7 continually. We hear a great deal in recent times about
8 global changes, profound global changes in the
9 environment that occur independently of any action like
10 this. What is their bearing on all of this.

11 The multiple barrier system consists
12 basically of two major components, an engineered barrier
13 and a natural barrier. And the engineered barrier has
14 three subsystems in it, the high level nuclear waste
15 itself, the containers, and the vault in which the waste
16 is placed.

17 With respect to the high level nuclear
18 waste, what are the relevant biological, chemical and
19 physical properties of the waste and of the surrounding
20 environment that govern the leaching and dissolution and
21 subsequent transport of the waste. What long-term
22 changes in the physical and chemical form of the waste
23 may be expected and how will these affect the leaching
24 and dissolution rates.

25 What interactions can be expected between



1 the radioactive wastes and the ground water in contact
2 with the waste. What changes in the local chemistry of
3 the ground water can be anticipated due to the
4 dissolution and leaching of the waste. What gas buildup
5 and escape from the waste can be anticipated. What
6 microbiological interactions with the waste can be
7 anticipated.

8 With respect to the container, what is a
9 suitable container. How is it defined and can a
10 suitable container material be selected from available
11 materials. What factors will govern the corrosion and
12 failure rates of containers in the vault environment.
13 What rates of release of radio-nuclides from the
14 container system can be anticipated.

15 With regard to the disposal vault, what is
16 a suitable repository vault design and what contingency
17 plans are included in this design for surprises that
18 occur between the time that it is initially conceived
19 and the time that the design is executed. What is the
20 expected performance of a vault during construction and
21 during loading. What is the expected long-term
22 performance of a vault after it is sealed. What are the
23 parameters and the models that can be used to predict
24 long-term performance. What consequences follow from
25 deviations from the predictions or inaccuracies in



1 available measurements.

2 What are the potential environmental
3 impacts of the transportation and handling of the high
4 level nuclear waste at a repository site. With respect
5 to the natural barriers, we choose to make a distinction
6 between subsurface and surface rather than biosphere and
7 geosphere because we think that the biosphere and
8 geosphere overlap substantially, that organisms exist at
9 all levels including the waste itself and the vault.

10 So speaking first of the subsurface
11 environment, we think the fundamental question here is,
12 what fluid flows may be expected into the vault and from
13 the vault to the surface under normal and abnormal
14 conditions and what are the critical pathways and
15 mechanisms for contaminant transport to the surface
16 environment.

17 With respect to the surface environment,
18 our basic question is, what are the critical pathways
19 and barriers for transport and concentration of
20 contaminants that do reach the surface environment.

21 With respect to site characterization
22 procedures, we think it is necessary for the proponents
23 to demonstrate that the appropriate techniques have been
24 developed to identify sites with the relevant properties
25 and that the techniques are reliable and valid for the



1 Canadian Shield.

2 Other questions that we would ask are,
3 what criteria will be used for site selection, what is
4 the basis for choosing these criteria, and in what
5 hierarchy these criteria be applied.

6 This is our preliminary assessment of the
7 direction in which our recommendations to the Panel will
8 move and I would be pleased to answer any questions that
9 there might be.

10 THE CHAIRMAN: Thank you very much, Dr.
11 Price. Are there questions which the Panel would choose
12 to put to the Chairman of the Scientific Review Group?

13 DR. van VLIET: You described this as
14 primarily your list of questions of course from which
15 you are working now and if I understood you correctly,
16 you hope to be in a position to provide answers to a
17 number of those at least at the conclusion of this round
18 of hearings which will be later in November in Winnipeg?

19 DR. PRICE: Our intent is to prepare a
20 document for November in which we will provide advice to
21 the Panel on the questions that should be presented to
22 the proponent as part of the guidelines and the general
23 direction that those questions will take is what I was
24 trying to convey here.

25 THE CHAIRMAN: I take it from the absence



1 of questions that we found that a very clear
2 presentation of your present position and we will look
3 forward to hearing in more detail from you towards the
4 end of the hearings then, Dr. Price. Thank you very
5 much indeed.

6 ---Dr. Price withdraws

7 Could I call next on Dr. B.S. Shukla of
8 Shukla & Associates. He is going to present a
9 presentation on behalf of his firm.

10 PRESENTATION BY DR. SHUKLA:

11 Mr. Chairman, ladies and gentlemen, I am
12 going to talk on the Nuclear Fuel Waste Management and
13 Disposal Concept.

14 One of the peaceful uses of fission energy
15 is the generation of electrical power. Many countries
16 have commercial nuclear power stations to augment their
17 electricity production. However, the strategy for safe
18 disposal of the high level waste in geological formation
19 is still under the research and development stage. The
20 reason for the slow pace of implementation of the
21 disposal of high level waste in the geological formation
22 is due to the ease of handling high level waste if its
23 storage time prior to the disposal is longer, and it can
24 be tens of years. For example, within one hour of being
25 removed from the reactor, the used fuel bundles have



1 lost over 60 per cent of their radioactivity and after
2 10 years the used fuel is 1000 times less radioactive
3 than it was when first removed from the reactor.

4 The issues that can be selected and
5 discussed in this review meeting have been described in
6 an Issue Paper by the LURA Group. The issue that is
7 described in this paper is the relative merit of the
8 disposal of recycled vitrified High Level Waste Form in
9 comparison to the Nuclear Fuel Waste Form.
10 Vitrification option which follows the recycling
11 operation has been mentioned in the AECL report, but its
12 importance in the light of the 3Rs - reduction,
13 recycling and reuse - of the waste materials has not
14 been assessed. However, the problem associated with the
15 leaching and migration of Plutonium present in the
16 Nuclear Fuel Waste Form, if disposed of in the
17 geological formation, is also addressed in this paper.

18 3Rs of High Level Waste Management. Now,
19 generally we talk about the nuclear waste forms so we
20 can -- vitrified High Level Waste Form when we fix the
21 nuclear waste in glassy matrix (phoen.) and the one that
22 is proposed by the Atomic Energy Commission, that is
23 without fixing it anywhere but it is already fixed in
24 the -- and that for itself is to be put in the
25 geological formation. And this is known as nuclear fuel



1 waste form. It can be glass and ceramics too by
2 controlled distillation of the vitrified form. So there
3 are differences. I will be talking some forms and forms
4 so I am trying to -- this term.

5 To examine the High Level Waste management
6 in the light of 3Rs of waste management, we have to
7 identify the useful and useless components of the
8 Nuclear Fuel Waste Form. The composition of the Nuclear
9 Fuel Waste Form is given in this slide.

10 The one that is within the red lines, that
11 is the real waste and the one which is not within the
12 red line is not the real waste but if you follow the
13 Atomic Energy's proposal, then everything is waste. And
14 in fact it is less than one per cent waste.

15 Table 1 indicates that if the Vitrified
16 High Level Waste Form option is followed, the waste
17 components are less than one per cent; and the remaining
18 99 per cent Plutonium 239 and unused UO2
19 of the Nuclear Fuel Waste Form can be recycled and
20 reused. Thus the 3Rs of the waste management are
21 satisfied only by opting for the Vitrified High Level
22 Waste Form.

23 The volume reduction in the Nuclear Fuel
24 Waste Form and the Vitrified High Level Waste Form can
25 be calculated by considering the following data. In the



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1 report it is mentioned that the volume reduction is not
2 there if the Vitrified Form is followed but that is not
3 true. Actually there is more than two times volume
4 reduction if we can simply calculate it here because the
5 density of the UO₂ is about 10.96 and density of the
6 glass is around 02.5 and if we just calculate about 8.1
7 per cent to 8 per cent fission -- calculate the
8 vitrified mass -- weight per cent of the High Level
9 Waste so it comes about 91.3 cc whereas the other comes
10 4 cc and clearly it is more than two times.

11 So this is very important completion.

12 Reprocessing implies recycling and reuse
13 of Uranium 238 and Plutonium 239 through breeder reactor
14 technology for further nuclear energy production.
15 Figures 1 and 2 show the uranium fuel reprocessing cycle
16 and reprocessing schemes respectively.

17 It is very interesting in the sense that
18 if we don't follow the reprocessing and breeder reactor
19 technology, we have to do all the operations except
20 those which are preferred in the red so if we opt for
21 nuclear energy production we have to do all of these
22 from the exploration of mining and building,
23 construction, -- tool fabrication, reactor, all these
24 things except we are eliminating these two things. But
25 by eliminating these two things, we are actually



1 eliminating a huge source of energy.

2 So this is very important to analyze the
3 Atomic Energy scheme. This is another process, this is
4 actually the -- this is not a really tough process of
5 the nuclear fuel reprocessing. Because this is a
6 soil reduction process and here they simply separate
7 uranium and plutonium and High Level Waste which comes
8 less than only one per cent as I showed earlier. That
9 forms the High Level Waste.

10 The Plutonium 239 breeding reactor -- okay
11 this is the breeding technology by which we can
12 continuously convert Uranium 238 or the Plutonium 239
13 and we can use all the energy sources and which I will
14 describe. The last part, several hundred thousand of
15 years.

16 The Plutonium 239 breeding in a reactor is
17 schematically shown in the figure. The symbol "n" is
18 for the neutron. Just as oxygen is necessary for
19 burning the coal, neutron is required for splitting the
20 fissionable nuclei in the fission reaction which is the
21 source of nuclear energy. Since nuclear reactor does
22 not need oxygen, the nuclear powered submarines can
23 remain inside the water body of an ocean for
24 indefinitely long period of time, whereas fossil fuel
25 operated submarines need oxygen. However, as shown in



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1 figure-4, the neutron is required for both fission and
2 breeding and, therefore, neutron economy is very
3 important in a breeding reactor.

4 It is important to point out that based on
5 the complete utilization of Uranium 238 isotope, natural
6 abundance of Uranium 235 which is really used in the
7 CANDU reactors is only .72 per cent and the Uranium 238
8 is 99.27 per cent. Through the breeder technology,
9 500,000 megawatt electricity can be supplied for 50,000
10 years - 50,000 years - using uranium available in the
11 United States of America. The installed nuclear capacity
12 of the Canadian reactor is only 12,500 megawatt
13 electricity and this is only 2.5 per cent of the above
14 estimate.

15 It is also important to note that from
16 the AECL report that, "By the year 2000, the energy
17 content of Canada's stored used fuel will exceed
18 Alberta's estimated remaining conventional oil reserve".
19 In this paper it is surmised that this calculation by
20 Atomic Energy Canada Limited is also based on the
21 assumption that all the Uranium 238 can be utilized for
22 the nuclear energy production. Assuming that the
23 Canadian natural inventory of uranium is similar to that
24 of American, the uranium for the electricity production
25 will be sufficient for hundreds of thousands of years to



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1 come. It is important to point out that the above
2 statement is true only if we follow the reprocessing and
3 the breeding technology for nuclear energy.

4 In view of the above, the 3Rs of the waste
5 management are satisfied, if and only if, the disposal
6 of the vitrified High Level Waste in the geological
7 formation is opted.

8 It is important to mention that the
9 nuclear fuel waste disposal concept has a favourable
10 trade-off as it bypasses the reprocessing and the
11 vitrification steps which do release radioactivity to
12 the environment. However, the nuclear fuel waste
13 disposal concept can only be justified as a better
14 choice than vitrified High Level Waste Form disposal
15 concept, if it is proved by the AECL that the
16 reprocessing and vitrification processes are equally or
17 more dangerous and hazardous than the nuclear reactor
18 itself.

19 Now I will be talking about the spent
20 nuclear waste form and the vitrified waste form in
21 geological formation.

22 The performance of waste forms in
23 geological formation can be judged in terms of the waste
24 form properties, like intensity of the radioactivity
25 associated with the form; heat released from the waste



1 form; and temperature build up in the geological
2 formation; solubility and leachability of waste form and
3 the release of and migration of Plutonium 239 from the
4 waste form.

5 So I will first talk about the
6 radioactivity of the waste form.

7 This figure shows the -- it's not very
8 clear but as it can be seen, that about five years,
9 since about more than 10,000 years the plutonium
10 activity of the plutonium will remain as such without
11 much declining. And this is a very big concern. Though
12 as somebody told that radioactivity doesn't change by
13 itself but it is not true, radioactivity is constantly
14 changing in the reactor and so this plutonium can be
15 changed into some other things less harmful, less --
16 life and will easily -- (incomprehensible) -- down.

17 Heat release. Anyhow, it can be shown
18 that the heat release also is more in the spent fuel
19 form than in the vitrified form because of its high
20 radioactivity.

21 Solubility and leachability of the waste.
22 The presence of Plutonium 239 in the spent fuel waste is
23 very much undesired due to toxicity. However, the
24 uranium matrix in which the Plutonium 239 and the other
25



1 radioactive materials are embedded, has suffered intense
2 radiation damage due to fission reactions while in the
3 reactor. And it is also not as insoluble towards water
4 as the Silicon Dioxide/alumino-silicate glasses or other
5 specific glass-ceramics tailor made for the
6 encapsulation of fission products. Table 2 shows --
7 there's a table that shows the --

8 This is a table that shows under the
9 reducing conditions which is quite important in our
10 disposal conditions, these SiO₂ solubilities quite less
11 than the Plutonium 238 which is the matrix in the
12 nuclear fuel, spent fuel.

13 So even on this realistic, this is not so
14 desirable.

15 The presence of Plutonium 239 in the spent
16 fuel form definitely makes it more hazardous than the
17 reprocessed waste and forces mathematical modelers/AECL
18 scientists to guess rather than predict what would
19 happen in the distant future after tens of thousands of
20 years. Will the Plutonium 239 pollute the aquatic
21 system or not? The Oklo and Cigar Lake scenario may be
22 applicable or may not be applicable to the disposal of
23 nuclear fuel waste in geological formation, because the
24 stability of man-made structure in the geosphere is
25 certainly weaker than the intact geosphere from time



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1 immemorial with undisturbed monolithicity. The
2 recycling option will eliminate the pollution of the
3 aquatic system/geosphere and hence of the food chain by
4 Plutonium 239.

5 Storage time before recycling.

6 THE CHAIRMAN: Excuse me, Dr. Shukla, you
7 have had the floor for 15 minutes or a bit more now. I
8 wonder if I could ask you to try to sum up the
9 conclusions part in one or two minutes.

10 DR. SHUKLA: I am just to my conclusion.

11 There are four conclusions:

12 The reprocessing of the spent fuel is
13 necessary before disposal in accordance
14 with the 3Rs of the management of the
15 waste materials.

16 The reprocessing of the spent fuel is also
17 necessary considering the energy potential
18 of Uranium 238 and Plutonium 239 through
19 breeder reactor technology. Nuclear fuel
20 disposal concept treats these materials
21 as radioactive garbage.

22 Third, the reprocessing is also necessary
23 for the isolation of the Plutonium 239
24 from the nuclear waste before disposal
25 otherwise the Plutonium 239 has high



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1 potential of polluting the aquatic system
2 in tens of thousands of years to come.
3 The nuclear fuel waste disposal concept
4 can only be justified as a better choice
5 than the vitrified high level waste form
6 of the disposal concept, if it is proved
7 that the reprocessing and vitrification
8 proceses are equally or more dangerous and
9 hazardous than the nuclear reactor itself.
10 Thank you very much. I'm sorry to take
11 slightly more time.

12 THE CHAIRMAN: Thank you. I'm sorry to
13 have to remind you but we must take into account the
14 many others who will want to speak before us this
15 afternoon and this evening.

16 Could I ask the Members of the Panel if
17 they have any further questions to put to Dr. Shukla as
18 a result of this presentation. You were kind enough to
19 give us copies of your paper so that we can read it
20 again.

21 DR. SHUKLA: I have already submitted this
22 paper and I have given to all of you ten copies.

23 THE CHAIRMAN: We have copies I think
24 available, thank you.

25 Are there any questions which Panel



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1 Members wish to put? Mr. van Vliet.

2 MR. van VLIET: What reprocessing
3 facilities are available in Canada or are available to
4 the Canadian...

5 DR. SHUKLA: We don't have reprocessing
6 plant in Canada and in a lot of advanced countries we
7 have -- for example, in UK we have, in France we have,
8 in America we have. Why we don't have here, I don't
9 know.

10 MR. van VLIET: How long would it take to
11 put a facility in place?

12 DR. SHUKLA: It won't take much time. I
13 would suggest any project, it takes some time. Three,
14 four years, maybe four years, depending on the urgency
15 of the project.

16 MR. van VLIET: What new and different
17 radioactive materials will be created by the
18 reprocessing?

19 DR. SHUKLA: Pardon me?

20 MR. van VLIET: What different waste
21 forms?

22 DR. SHUKLA: Yes, that is what I told you.
23 That waste forms, actually this proposal by AECL is two
24 things. The first thing the nuclear waste form and the
25 second thing, the geological disposal.



1 Now, the geological disposal is
2 internationally agreed upon that it is okay, this is a
3 good way of disposing of the nuclear wastes. But so far
4 as the nuclear waste form is concerned, this has no
5 credence at all, I am telling you and I think very few
6 countries are considering it but nobody is going to do
7 it.

8 THE CHAIRMAN: Dr. Lapierre?

9 DR. LAPIERRE: What is the cost of setting
10 up a recycling system?

11 DR. SHUKLA: The cost of recycling. It is
12 nothing, it produces plutonium and, you know, it is very
13 costly and the cost of the investment cost so in fact it
14 will give more than the investment.

15 DR. LAPIERRE: So it's a cost recovery
16 system?

17 DR. SHUKLA: Surely. It will be very
18 profitable, I think.

19 THE CHAIRMAN: Ms. Roy.

20 MS. ROY: Yes. So if I follow you
21 correctly, you would like the proponent to be asked in
22 the EIS to compare the benefits and impacts of the
23 Nuclear Waste Disposal Concept to what you call the
24 Vitrified High Level Waste Form Disposal Concept, am I
25 correct?



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1 DR. SHUKLA: Yeah, sure.

2 MS. ROY: Okay, thank you.

3 THE CHAIRMAN: Thank you very much indeed,
4 Dr. Shukla.

5 DR. SHUKLA: Thank you.

6 ---Dr. Shukla withdraws

7 THE CHAIRMAN: I would call next on Dr.
8 Ian Rowe of Spar Aerospace.

9 PRESENTATION BY DR. ROWE:

10 Thank you, Mr. Chairman. I can either use
11 overheads or proceed directly as you have the
12 presentation there in front of you.

13 I will proceed with the overheads.

14 THE CHAIRMAN: Would you be sure to use
15 the microphone so that those who are recording the
16 proceedings will be sure to catch them as well as the
17 audience, thank you.

18 DR. ROWE: I guess I will sit down then.

19 First off, Mr. Chairman, thank you very
20 much for the opportunity of addressing this panel. I am
21 not here to promote Spar, I am here to promote, if you
22 want, a design methodology and some considerations that
23 have arisen in the aerospace industry, simply to bring
24 them to the attention of your panels that you might
25 benefit therefrom.



1 To those who do not know what Spar is,
2 Spar Aerospace is a supplier of robotics, remote
3 manipulator systems and to essentially hazardous
4 environments. What I mean by hazardous environments, I
5 think we all acknowledge space is a hazardous
6 environment, mining systems are hazardous environments
7 and nuclear systems are hazardous environments. Just to
8 give you some examples, on the upper left, we have a
9 manipulator which was developed for Ontario Hydro, the
10 purpose of which was to facilitate retubing nuclear
11 reactor in a hot environment.

12 On the upper right is a roof bolting
13 system that we developed for the mining industry. And I
14 think it is very interesting if you look at the history
15 of the mining industry, they are prepared to accept risk
16 and death at a level that I suspect that the detractors
17 of atomic energy would find unacceptable.

18 In other words, the mining history and our
19 history and our culture has grown up to accept risks,
20 but the purpose of the roof bolting system was to try
21 and minimize this risk by using robotics in place of
22 people, to put the people in the safe areas and minimize
23 accidents and so on.

24 The bottom right is a manipulator again
25 built for working in a hostile environment, a nuclear



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1 reactor, that was for the U.S. Navy.

2 So recapping then, whom do we serve? We
3 look to the requirements of the space, defence, and
4 mining nuclear markets in essentially the hostile
5 environments that I have pointed out.

6 As the challenge was given to us by our
7 president, we want to think that this Panel would
8 understand very well to try and extend the reach of the
9 human mind; to expand the limits of the possible. And I
10 think indeed as we look at the problem of disposing or
11 remediating of wastes, we are indeed talking about
12 innovation, discovery of really controllable risks.

13 Now, at Spar we do believe that Canadian
14 CANDU technology can be managed safely, now and for
15 future generations.

16 And I have been doing some work recently
17 with the Department of Energy in the United States and
18 their problems there of remediation of sites. They are
19 very severely contaminated because of the defence
20 industry that they have had there and became quite
21 conscious of the fact as the Department of the Energy
22 did become conscious that the aerospace industry had a
23 methodology, an approach if you want, to minimizing
24 risks, that could be and should be considered in the
25 nuclear business.



1 So I would suggest to you that safe
2 management includes what I will call the systems design
3 approach. Indeed I heard the first two submissions and
4 I think that they were very good, very comprehensive.

5 I became concerned, Mr. Chairman, and I do
6 apologize, but I became concerned at some remarks that
7 you made which were you were going to focus or have the
8 Panel focus on the siting and then you used the words
9 "as well as" and then you went on and talked about some
10 of the other things, such as transportation and so on.

11 The systems design approach is one that
12 looks at the totality of an integrated system and this
13 is something that we have learned through the aerospace
14 industry that it is not acceptable to focus on parts of
15 the problem without understanding completely how the
16 problem intersects, how the problems intersect.

17 And so the systems design, I would suggest
18 to you, is the integration of retrieving, of
19 containerization, of transporting, of manipulating,
20 storing, of monitoring, indeed the whole cycle.

21 And I believe that truly that Ontario
22 Hydro and Atomic Energy appreciate that, that probably
23 is really one of a matter of perspective on how you
24 approach the integration problem so the issues do extend
25 beyond siting.



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1 I was pleased to see in the opening
2 remarks by AECL that they were indeed considering risk
3 management, but it is rather interesting that risk
4 management and the atomic nuclear business has
5 paralleled the growth of risk management in the
6 aerospace business. The objectives are a lot the same.
7 The methodologies are indeed parallel and I suggest to
8 you that there might be something to be learned from the
9 aerospace industry. Because, as with the nuclear
10 industry, the press, the media, the concern of all
11 people focuses very highly on the industry when we have
12 things like a launch, the Challenger, and the like.

13 And so the industry in aerospace has
14 developed risk management methodology, reliability,
15 teams and concepts have been developed for manned space
16 programs, hazard analysis, failure modes and effects
17 analysis, FMEA, maintainability, a failure tree
18 analysis, sneak circuit analyses, redundancy issues and
19 so on. I am not an expert in this area. My expertise
20 is really to, in the systems design, to point out that
21 all of these elements are brought together in the
22 systems design methodology for risk minimization.

23 So when you look at the scoping issues, I
24 would hope and I am sure you will extend beyond the site
25 selection and look at the entire cycle and its



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1 interactions, the retrieval, containerization and so on.
2 Just to try and use an example, if you focus on just
3 containerization and I have read some of the papers
4 Ontario Hydro has put out on flasks and so on, and you
5 lose the perspective that at some stage you may have to
6 run that up and down a mine hoist and so on, you might
7 very well approach containerization differently. The
8 transportation cycle isn't just on the road, the
9 transportation cycle begins at the point of collecting
10 the fuel and ends at the point where you are satisfied
11 is under full monitoring.

12 So we are really interested in innovative
13 system design for total inclusion and reliability. The
14 systems design approach, risk assessment in our industry
15 starts out strongly with the functional requirements and
16 then responds with the specifications. This is
17 interactive, it feeds back and forth. And we try and
18 exploit then fail safe design procedures and fail
19 operative design procedures. And this again is
20 important because you will be dealing with a dynamic
21 systems such as transportation systems, such as taking
22 fuel and so on down into mines.

23 Fail safe/fail operative and the
24 trade-offs that go along with that are quite necessary.
25 And there is a formalization of that. Part of that



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1 formalization, and I haven't heard the expression used
2 here at all, is that of a concept design review. I would
3 hope you're not interested in just receiving the report,
4 I would hope you would be interested in receiving the
5 results of a conceptual design that has been looked at,
6 inspected by various people, risk items and so on raised
7 and disposed.

8 At this level in an aerospace system, I
9 would not be surprised to see 1000 or 2000 formal
10 questions raised long before a report became formal in
11 the public domain.

12 I suggest to you then, Mr. Chairman, that
13 the advantages of the system design approach are to
14 minimize subjectivity and concentrate on objectivity and
15 try and quantify the risk, achieving of course reliable
16 design and operation and minimum risk. And in the
17 integrated approach that I am suggesting to you, we
18 believe as the Department of Energy in the States is now
19 believing, nothing gets left out, hopefully nothing gets
20 left out.

21 So in summary, my recommendations would
22 be, and I think Ontario Hydro and Atomic Energy are very
23 competent in these areas, that the total systems design
24 approach be taken; that remote handling be considered to
25 reduce exposure and risk. And I think that remote



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1 handling capability now has advanced very substantially
2 in the last few years and in such as mining operations
3 as we have yet really to see this recognized, suggest to
4 you that you have the opportunity of recognizing this,
5 and that formal risk assessment and risk management be
6 applied.

7 In conclusion, it is the belief of Spar
8 that risk can be managed and if the methodology is
9 logical, total, comprehensive and integrated, the risks
10 can be understood by all of the parties involved and
11 that of course includes the public at large.

12 So, Mr. Chairman and to you of the Panel,
13 you have a very large problem ahead of you. I am
14 pleased to see that you are backed by I will call a
15 rather robust scientific panel and it is all ahead of
16 you so I wish you luck.

17 THE CHAIRMAN: Thank you, Dr. Rowe.

18 Are there any questions which the Panel
19 members may wish to put to Dr. Rowe. Ms. Roy?

20 MS. ROY: To evaluate risk that results
21 generated by comparisons are often helpful from my point
22 of view.

23 DR. ROWE: Correct.

24 MS. ROY: What should be the basic
25 comparison as to the proponent in the EIS if we want to



1 build a sort of framework helpful to decision making?

2 DR. ROWE: If I understand you, the
3 question is really one of finding a comparison and I
4 think you are suggesting perhaps a comparison or a
5 relevance if you want in what I might call the adjacent
6 field of aerospace.

7 MS. ROY: The system design. I am not
8 asking about just one comparison, maybe there are more
9 than one, but do you have an idea of the basic
10 comparison that should be asked if we want to make a
11 sort of reasoning helpful to decision making.

12 DR. ROWE: Okay, it is my personal belief
13 that the report should include what I might call a true
14 design concept in which the functional requirements and
15 the specifications are very clearly set out and it is
16 proven through tables, through matrices and so on,
17 through verification matrices that all of those
18 requirements are addressed in these first level
19 specifications.

20 I would then suggest to you that these
21 specifications then lead logically to perhaps a number
22 of concepts, the concepts themselves be subject to a
23 critical review, indeed an interaction, we call the
24 concept design review process.

25 It is one in which all of the subsystems



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1 are presented and the interfaces are very clearly
2 understood adjacently and the interfaces are clearly
3 understood in terms of whether or not they truly satisfy
4 the specifications.

5 There is absolutely no question in my mind
6 that there is the scientific capability out there to
7 write tomes in terms of geology and what have you, but I
8 don't think that is the issue. The issue is to derive a
9 compelling logic that this proposal is satisfactory and
10 has minimum risk and that is why I am process oriented.
11 Have I made my point clear?

12 THE CHAIRMAN: Mr. van Vliet.

13 MR. van VLIET: Dr. Rowe, I appreciate
14 that you have indicated to us your particular approach
15 to these design concepts.

16 Are you implying, by making these
17 recommendations, that from your assessment the proposal
18 for the waste disposal has not been subjected to the
19 systems design approach or has not been subjected to the
20 formal risk assessment and risk management that you have
21 outlined?

22 DR. ROWE: I would not make that
23 assessment. It would be unfair for me to make that
24 assessment because I have not reviewed the literature
25 and the many, many papers and so on that Atomic Energy



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1 has put out. That would be very unfair. I am
2 acquainted with the process and in one of my past
3 incarnations I became aware quite often that the logic
4 was not necessarily fully supported and very clear to
5 intervenors and to the public at large and in major
6 projects and major programs.

7 MR. van VLIET: You also made a
8 recommendation that perhaps a comparison between the
9 risk assessment could be done in the waste disposal with
10 the space agency. However, the record of the space
11 agency with its spectacular failures has not been all
12 that well received.

13 DR. ROWE: No, I think you are absolutely
14 right, sir, and that is one of the reasons why, after
15 the unfortunate Challenger disaster that NASA decided
16 it had to redevelop and approve its methodology and it
17 came to Canada to develop that methodology because it
18 recognized that we had developed a methodology that was
19 enduring. They spent many weeks with us and then went
20 off with that information to then carry out its
21 investigations and so on at Morton Thiokol and others.
22 And we are rather proud of the fact that we did obtain a
23 NASA achievement identification and that the industry
24 has perhaps a benefit from these unfortunate disasters.
25 It was required to go back to base one and re-examine



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1 its approach and I submit to you that the methodology
2 has improved with time.

3 THE CHAIRMAN: Dr. Fyfe.

4 DR. FYFE: Yes, I think your suggestion
5 you are making that other people who deal with very high
6 risk ventures should be asked to look at this is
7 excellent. There is a very big difference though with
8 the aerospace Challenger accident doesn't really affect
9 the environmental much, but a major nuclear waste
10 accident like Chernobyl illustrates it beautifully, has
11 a considerably greater impact. So this problem is
12 infinitely more serious.

13 DR. ROWE: I totally agree which is why the
14 logic must be impeccable.

15 DR. FYFE: I think your idea to bring in
16 very different groups to look at this is an excellent
17 idea, systems analysis.

18 THE CHAIRMAN: Thank you very much indeed,
19 Dr. Rowe, for bringing to our attention the perspective
20 of your industry and your firm when we get started on
21 tackling this difficult question.

22 ---Dr. Rowe withdraws

23 THE CHAIRMAN: May I suggest that it now
24 being 3:30 we might take a ten-minute break for coffee
25 or whatever is served at the back of the room, I imagine



1 that's it. But I will have the meeting under way again
2 at most in 15 minutes from now. I will call it then
3 regardless of the state of presence or absence from the
4 hall.

5 ---Recess at 3:30 p.m.

6 ---On resuming at 3:50 p.m.

7 THE CHAIRMAN: We will resume our
8 hearings, please, meeting and ask that the next
9 presentation be made by Mr. David Pascoe of Environment
10 Canada.

11 PRESENTATION BY MR. PASCOE:

12 Mr. Chairman, Members of the Panel, and
13 Scientific Review Group, ladies and gentlemen, before I
14 begin I would like to introduce Dr. Richard Jackson and
15 Dr. Donald Lesh sitting beside me who are leading
16 technical teams to assist Environment Canada in its
17 review of the nuclear fuel waste management and disposal
18 concept. Drs. Jackson and Lesh will be available to the
19 Panel today to respond to technical questions.

20 Environment Canada's overall
21 responsibility is to represent the interests of the
22 environment. Thus, Environment Canada intends to be a
23 party to the nuclear fuel waste management and disposal
24 review to advance the interests of the environment, and
25 to ensure that all matters regarding environmental



1 protection are properly considered throughout the
2 process.

3 The mandate of the department is to foster
4 harmony between society and the environment for the
5 economic, social and cultural benefit of present and
6 future generations of Canadians.

7 The Department of the Environment Act
8 provides Environment Canada with the general
9 responsibility for environmental management and
10 protection. Environment Canada is responsible for
11 providing environmental advice to federal government
12 departments, and for the preservation and enhancement of
13 environmental quality.

14 Section 36 of the Federal Environmental
15 Assessment and Review Process Guidelines Order,
16 establishes the role of non-initiator and non-proponent
17 departments during public environmental assessment panel
18 reviews. That section states, among other things, that
19 "in a public review, it is the role of every department
20 that has specialist knowledge or responsibilities
21 relevant to a proposal to advocate the protection of the
22 interests for which they have the responsibility."

23 In 1988 the House of Commons Standing
24 Committee on Environment and Forestry produced a report,
25 "High Level Radioactive Waste in Canada: The Eleventh



1 Hour". One of the recommendations in the report was
2 that as part of its mandate, "Environment Canada should
3 rapidly assemble resources with a view to defending the
4 environmental standpoint during the upcoming debate on
5 the Canadian nuclear fuel waste management program". In
6 its response to that recommendation the government
7 agreed, saying that it would review AECL's final concept
8 assessment document and other documents and would
9 prepare its own brief.

10 To fulfill its obligations under the
11 departmental mandate, its responsibilities under the DOE
12 Act, the requirements of the EARP guidelines order, and
13 the commitment made in the response to the 11th hour
14 report, Environment Canada will intervene before the
15 Environmental Assessment Panel to assist them in
16 ensuring that the impact that the proposed disposal
17 concept will, or may, have on the environment is fully
18 investigated and clearly documented by the proponent.
19 The department will conduct a technical review of the
20 AECL's Environmental Impact Statement documents and
21 other documents used to prepare the Environmental Impact
22 Statement.

23 It should be noted that Environment Canada
24 will not intrude into the areas which are not within its
25 mandate, for example, human health effects, nor will it



1 represent interests of other groups or agencies during
2 this review. Environment Canada will, however, exchange
3 information within its mandate with other agencies or
4 groups.

5 - Environment Canada has also prepared, in
6 addition to this summary submission, a more complete
7 written submission. That submission presents the more
8 detailed examination of issues that the department feels
9 should be included within the scope of the panel review,
10 and thus in the Environmental Impact Statement
11 guidelines.

12 The submission begins by presenting the
13 reasons for Environment Canada's interest in the review
14 process, through discussions of its mandate, role and
15 responsibility. It then moves on to give
16 recommendations on specific issues. The issues have
17 been grouped in categories corresponding to the major
18 elements of the disposal concept. They begin with some
19 general policy and technical issues and then proceed to
20 waste production and storage, transportation, surface
21 facilities, subsurface facilities, geosphere and
22 biosphere. The submission concludes with a discussion
23 of three groups of issues that must be reflected in any
24 review of this magnitude, those involving social
25 concerns and public participation, those concerned with



1 economics and financing, and those relating to quality
2 assurance and quality control of the computer models
3 used to conduct environmental assessments.

4 Environment Canada wishes to ensure that
5 the best possible environmental protection practices and
6 technologies are used for the handling, storage and
7 disposal of all wastes associated with nuclear electric
8 power generation in Canada.

9 The questions of most concern to
10 Environment Canada are:

11 What are the options for disposal that
12 have been considered by the proponent?
13 And, will the options that have been
14 chosen safeguard the environment?

15 To address these two questions,
16 Environment Canada's goal is to have the proponent
17 rationalise the choices that have been made in the
18 development of the disposal concept relative to possible
19 options that have been studied and selected by other
20 countries. The proponent should justify that they have
21 selected the best casks in which to transport the fuel,
22 the best container in which to package the spent fuel,
23 the best geological medium in which to place the
24 repository, the best buffer and backfill material with
25 which to surround the containers and refill the



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1 repository, the best grout with which to seal fractures
2 and joints adjacent to the repository, et cetera.

3 Further, the review must show that the environment will
4 be protected not just during the construction and
5 operation of the facility, but over the long-term life
6 of the wastes.

7 Highlighting our major concerns under each
8 of the headings in this submission, topics that should
9 be fully addressed in the Environmental Impact Statement
10 include the following:

11 General Policy issues.

12 Given the scope of the concept and its
13 associated complexities, the time allowed the
14 intervenors to review the completed Environmental Impact
15 Statement should be at least eight months, perhaps more
16 depending upon the length and the complexity of the
17 Environmental Impact Statement. Supporting scientific
18 and technical documents used to prepare the
19 Environmental Impact Statement must be published by AECL
20 at least six months before submission of the
21 Environmental Impact Statement.

22 A key decision that has to be made is
23 whether permanent disposal is a better choice than
24 secure long-term storage. This decision must be made
25 taking into account social, economic and environmental



1 factors. With respect to the environment, the
2 Environmental Impact Statement must demonstrate that
3 permanent disposal poses no unacceptable threats to
4 environmental safety since any release of environmental
5 significance from a-sealed repository would be
6 inaccessible and could therefore not be readily
7 corrected. We must be convinced that permanent disposal
8 is the most appropriate option that could be selected at
9 this time.

10 General Technical issues.

11 Atomic Energy of Canada Limited should be
12 required to justify the various elements of its concept,
13 in terms of international practices, to show that the
14 concept is based on the best available technology.

15 The effects of events of low probability,
16 but of potentially great environmental significance, for
17 instance, seismic disturbances, climate change,
18 unintentional intrusion into the repository, et cetera,
19 must be evaluated in how they may affect the concept.

20 Past waste management practices of the
21 proponent, and of Canadian utilities operating nuclear
22 generating stations, are important indicators of what
23 could be expected in terms of safe handling of spent
24 fuel wastes. These should be presented in the
25 Environmental Impact Statement.



1 Waste production and storage.

2 All forms of high-level wastes associated
3 with nuclear power generation, for example, spent fuel,
4 reactor components, possible future reprocessing wastes,
5 which will or may result from nuclear power generation,
6 should be included in the review.

7 The containers used to house the spent
8 fuel bundles should be assessed and compared with the
9 designs proposed by other countries.

10 Transportation.

11 Attention should be paid to the
12 transportation casks and proposed methods of transport
13 and handling, to address issues such as dual purpose
14 storage/transportation casks; anti-sabotage designs;
15 frequency; size and number of shipments; routes; support
16 facilities; emergency planning; et cetera. Risk, and
17 impact assessment and response should be included for
18 each factor.

19 Surface Facilities. In addition to an
20 assessment of the primary facility and its ability to
21 safely handle and process high-level nuclear wastes,
22 AECL should determine the environmental impacts of
23 ancillary activities such as water use, clay mining,
24 rock stockpiling, preparation of growth mixtures,
25 container fabrication, associated with the development



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1 and operation of surface facilities. This type of
2 review should include a comparison between a single
3 large disposal facility versus smaller regional sites.

4 The processes, techniques and criteria
5 that could be used to characterize and identify sites
6 for a disposal facility, the determination of the
7 priority, costs and benefits of dedication or use of a
8 site for activities connected with radioactive waste
9 disposal compared with other present or potential uses
10 of the same site or sites, and the availability of
11 potential suitable sites should be documented.

12 Subsurface Facilities.

13 The materials used in construction and
14 closure of the repository must be shown to withstand the
15 anticipated subsurface conditions over a sufficiently
16 long period so as to conclusively demonstrate the
17 long-term integrity of containment.

18 Uncertainties associated with subsurface
19 processes, for example, geomechanical stresses and the
20 way they could influence the development of the vault
21 and its subsequent integrity as a containment facility,
22 and cpmseiqemt release to the environment, must be fully
23 documented and addressed.

24 Geosphere.

25 The adequacy of plutonic rock as a host



1 rock and as a barrier to radionuclide transport must be
2 justified in comparison with other rock types in
3 Ontario.

4 AECL must demonstrate its ability to
5 identify and characterize subsurface transport routes
6 and processes as part of the process to evaluate
7 potential disposal sites.

8 The Environmental Impact Statement must
9 explain how groundwater flow systems will be defined in
10 plutonic and surrounding rocks so that reliable
11 estimates of radionuclide migration from the vault to
12 the biosphere may be made over the entire period for
13 which the radioactive wastes are to be contained.

14 Biosphere.

15 AECL must demonstrate an adequate
16 understanding of the movement through the biosphere of
17 radionuclides and other elements of potential concern
18 such that an environmental risk assessment can be
19 undertaken. This assessment must include an evaluation
20 of releases from the repository and the effects of those
21 releases on a reference environment at the individual
22 organism, species, community and broader ecosystem
23 level.

24 The components of the reference
25 environment must be properly defined, must include



1 factors to reflect sensitive ecosystem components such
2 as endangered species, and their models should be
3 calibrated with parameter values associated with the
4 different environments of the Canadian Shield.

5 Social Issues and Public Participation.

6 The Environmental Impact Statement should
7 incorporate a discussion of the social impacts of the
8 proposed concept, and the methods that could be used to
9 measure and mitigate them.

10 Public participation processes in other
11 jurisdictions should be reviewed to ensure that the
12 procedures available to Canadians in this review,
13 provide at least as good an opportunity for review and
14 discussion of environmental issues as those elsewhere.

15 Economics and Financing.

16 Cost estimates must be made for siting,
17 construction, operation, closure, and monitoring of a
18 high level radioactive waste disposal facility. This
19 information is required to determine the feasibility of
20 building such a facility and its optimum size, to assess
21 the economic impacts, and also to provide net or overall
22 cost figures that can be used to assess the role of
23 nuclear power as one of many energy options.

24 The proponent should provide a risk
25 benefit analysis of key components of the disposal



1 concept to illustrate the degree of balance in the
2 concept, relating to costs versus reductions in risk to
3 the environment.

4 Modeling and Quality Assurance/Quality
5 Control.

6 Atomic Energy of Canada Limited must
7 demonstrate that its models have been verified and
8 validated, and can be used with confidence to conduct
9 environmental and safety assessments.

10 The proponent must present a comprehensive
11 Quality Assurance/Quality Control program for the entire
12 concept.

13 The written submission contains many more
14 individual recommendations, all of which Environment
15 Canada considers worthy of being addressed in the
16 Environmental Impact Statement Guidelines being
17 developed for AECL.

18 In summary, Environment Canada believes
19 that the Environmental Impact Statement should prove
20 beyond a doubt that the proposed disposal concept is not
21 only the safest, but also the best option available now,
22 and for the future. The Environmental Impact Statement
23 should contain the proof that the environment can be
24 safeguarded, not just during any near future
25 construction or operation phases, but most importantly



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1 over the entire long-term design lifetime of the
2 disposal facility. Thank you.

3 THE CHAIRMAN: Thank you, Mr. Pascoe. I
4 will now ask the members of the Panel if they wish to
5 put any questions based on that presentation. Dr. Fyfe.

6 DR. FYFE: You know it really worries me
7 when we read your summary, "should prove beyond a
8 doubt...the concept is not only the safest...now, but
9 for the future." This means there will be no advances
10 whatever in the future, is that what you mean?

11 MR. PASCOE: What I mean is that the
12 options selected should preempt any scientific
13 developments in the future that turn out to be better
14 for the environment or for the technology of disposing
15 of high level wastes.

16 DR. FYFE: I am quite sure before this is
17 over if there aren't some options we haven't looked at I
18 would be very surprised so one thing is certain, it will
19 be a long time before we do anything.

20 THE CHAIRMAN: Dr. Wilson.

21 DR. WILSON: I had a question along the
22 same lines under major concerns on your second page. It
23 may be just an editorial thing you left out, but the
24 second question, "Will the options that have been chosen
25 safeguard the environment," I think I would probably



1 phrase it, to what extent will the options that have
2 been chosen safeguard the environment.

3 MR. PASCOE: That is certainly a good
4 question, yes.

5 DR. WILSON: Two other comments, under
6 surface facilities, that second paragraph about
7 determining the cost and benefits or the use of a site
8 and so on, I presume you mean the cost and benefits both
9 for the community on the site and for the industry, do
10 you?

11 MR. PASCOE: Yes, all costs and benefits
12 associated with the facility.

13 DR. WILSON: Or both?

14 MR. PASCOE: Yes.

15 DR. WILSON: Because quite often the
16 public doesn't understand the cost and benefits to the
17 industry as well as it might.

18 MR. PASCOE: Right, it should be all costs
19 and all benefits associated with the concept.

20 DR. WILSON: On both sides.

21 And the third comment on the top of the
22 last page under social issues and public participation,
23 I don't know why this is bothering me but it bothers me
24 that you said "the methods that could be used, on the
25 first paragraph, the environmental guidelines should



1 incorporate a discussion on the social impacts of the
2 proposed concept, and the methods that could be used to
3 measure and mitigate them." I mean it sounds like
4 social management to me and I automatically have a
5 question about that.

6 MR. PASCOE: I am sorry, I didn't
7 understand the question.

8 DR. WILSON: Well, it sounds as if the
9 public, if there should be some negative social impacts,
10 then what should be addressed is how to make them sound
11 positive even if the public knows they are negative. I
12 mean, it smacks to me of social management.

13 MR. PASCOE: That was certainly not the
14 intent.

15 DR. WILSON: Okay, well, perhaps that could
16 be changed. It is the word "mitigate".

17 THE CHAIRMAN: Other questions?

18 Thank you very much for this brief
19 presentation, Mr. Pascoe, and we shall of course have
20 available your fuller presentation from Environment
21 Canada.

22 MR. PASCOE: Right.

23 THE CHAIRMAN: Thank you.

24 ---Mr. Pascoe withdraws

25 THE CHAIRMAN: I will call next on Mr.



1 Beare of the Atomic Energy Control Board to make his
2 presentation on behalf of the Board.

3 PRESENTATION BY MR. BEARE:

4 Thank you, Mr. Chairman, Panel Members,
5 ladies and gentlemen.

6 I am John Beare, I'm Director General of
7 the Fuel Cycled Nuclear Materials Directorate of the
8 Atomic Energy Control Board. If at the end of my
9 presentation the members of the Panel have some
10 difficult questions, I have to my right Mr. George Jack
11 who is the manager of the Waste Management Division and
12 if you have some very difficult questions, we have to
13 his right Mr. Ken Bragg who is the head of the high
14 level waste section of the Atomic Energy Control Board.
15 The Atomic Energy Control Board, the AECB, is an
16 independent regulatory agency which reports to Parliament
17 through a designated minister, traditionally the
18 Minister of Energy, Mines and Resources.

19 The mandate of the AECB as set out in the
20 Atomic Energy Control Act is to control, that is to
21 regulate, the development, application and use of atomic
22 energy in Canada. The AECB was responsible for both
23 development and regulation from its formation in 1946
24 until 1954. Then the Act was amended to vest the AECB
25 with the regulatory role and the minister with the



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1 development role. The AECB should not be confused with
2 Atomic Energy of Canada Limited which is the proponent
3 for the proposal which you are to consider.

4 The AECB administers the Atomic Energy
5 Control Act and makes the regulations under that Act.
6 Everything involving radioactive substances and nuclear
7 facilities requires a license or other form of approval
8 from the AECB and no license or approval is issued
9 unless AECB standards are met. The AECB controls
10 nuclear energy from the time that the radioactive
11 substances are created by nuclear reactions or extracted
12 from the earth until they are discharged in effluents
13 from a facility, disposed of in an AECB approved manner
14 or decay to insignificance. It will therefore be
15 important for the Panel to take account of the AECB's
16 requirements during its review of AECL's concept
17 assessment.

18 The role of the AECB is best summed up by
19 its Mission Statement which is "to ensure that the use
20 of nuclear energy in Canada does not pose undue risk to
21 health, safety, security and the environment". This
22 statement is completely general and not limited by
23 geography or in time. The general proposition is that
24 if Canada and Canadians are adequately protected, so too
25 are those beyond Canada's borders. In the case of



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1 nuclear fuel wastes and other very long-lived
2 radioactive wastes it does not necessarily follow that
3 the measures that are adequate to protect this
4 generation will be adequate to protect future
5 generations.

6 Pending the outcome of the Panel's review
7 of the AECL's concept, the AECB requires licensees only
8 to store the irradiated nuclear fuels safely. The work
9 of the Panel is expected to be of major value to
10 decision-making by the Board, particularly regarding
11 future actions.

12 Information on the AECB's regulatory
13 process and standards is contained in appendix to this
14 paper which we have made available to the Panel members.

15 In the view of the AECB there are three
16 basic issues related to the management of nuclear fuel
17 wastes which the Panel should address. These issues
18 relate to the strategy for managing nuclear fuel wastes,
19 the standards to be used in the review of the
20 Environmental Impact Assessment, the EIS, and whether
21 long-term safety can be satisfactorily predicted with
22 the necessary degree of confidence.

23 With respect to the first issue, the
24 strategy for managing nuclear fuel wastes, the AECB
25 considers that there are three basic options and these



1 are:

2 Disposal as soon as possible;

3 Storage indefinitely; and

4 Disposal demonstration.

5 The first option, disposal as soon as
6 possible, involves temporary storage to allow the fuel
7 to cool and to await the availability of a suitable
8 repository which is likely to take a minimum of 25
9 years. In this option disposal of the irradiated fuel
10 wastes would occur as soon as the repository was
11 available without intentional deferral. This option
12 represents permanent disposal with no intent to recover
13 the wastes. Passive containment and isolation would
14 employed to eliminate any requirement for long-term care
15 and maintenance except for that implied in the temporary
16 storage and placement phases. This period could
17 possibly extend up to 75 to 100 years from today which
18 in this context is a relatively short time.

19 We expect, however, that any facility,
20 even one designed for the so-called walkaway solution
21 would be monitored indefinitely to verify that it
22 performs as designed.

23 The second option, storage indefinitely,
24 is a long-term storage which should be seen as an
25 alternative to prompt disposal rather than being



1 complementary. This option is open ended in that there
2 is no commitment to disposal at a given time in the
3 future. Periods of several hundreds of years are
4 contemplated by advocates of this option.

5 There is not sufficient knowledge to say
6 how long fuel bundles, as such, could be safely stored.
7 There is not even a common understanding of what safely
8 stored means for the long-term. However, fuel bundles
9 could be placed in corrosion resistant containers or in
10 specially designed above ground facility when the
11 bundles deteriorate to a certain point. The bundles
12 could be transferred to other containers or another
13 facility when the original ones deteriorated. In
14 principle this process could be repeated indefinitely.

15 This option would involve perpetual care
16 and maintenance. With this approach, work on the
17 development of the disposal of fuel wastes would not
18 need to be extended beyond concept assessment.
19 Attention would shift to the technology of long-term
20 storage.

21 The third option, disposal demonstration,
22 is intermediate between the above two options. A
23 disposal facility incorporating the essential features
24 of a full-scale facility would be developed and
25 constructed but most of the fuel could be stored above



1 ground or even in the underground facility in a readily
2 retrievable form as long as desired. Since public
3 acceptance, particularly acceptance by the public in the
4 vicinity of the site of a facility, is one of the major
5 hurdles that would be encountered for any disposal
6 facility and since such a demonstration might cost a
7 large fraction of the cost of a full-scale facility, a
8 supplementary requirement with this approach would be
9 that the demonstration facility would have to be capable
10 of being expanded to a full-scale disposal facility in
11 due course.

12 The cost of a demonstration facility may
13 be such a large fraction of that for a full-scale
14 facility that economically a proponent might see no
15 difference between the two. Conceptually, however,
16 there is a difference. For example, only a few of the
17 many caverns of a full-scale facility would have to be
18 closed and back-filled in a demonstration facility.
19 The remaining caverns could be excavated and filled with
20 fuel, but not back-filled, in order to make the fuel
21 more retrievable; and the fuel in those caverns could be
22 stored in a more retrievable form than for disposal.

23 In comparing these options, retrievability
24 is an issue for two reasons:

25 Retrievability would facilitate the taking



1 of remedial action if a facility does not
2 contain wastes adequately.

3 In the case of irradiated fuel,
4 retrievability would facilitate recovery
5 of the fuel for reprocessing, if such a
6 decision is made after the fuel has been
7 put in the facility.

8 There is therefore more justification for
9 retaining irradiated nuclear fuel in a retrievable form
10 than there is for waste from reprocessed nuclear fuel.
11 In reality the wastes in a facility would always be
12 retrievable at a price. The nature of the issue is more
13 financial rather than technical.

14 The advantages of the first option, that
15 is disposing of fuel wastes as soon as possible, are
16 that the beneficiaries of nuclear power would be seen to
17 be accepting responsibility for the waste produced and
18 thus no problems are transferred to future generations.

19 Passive measures are used to ensure safety
20 and environmental protection.

21 It is a permanent solution and can be
22 accomplished within a reasonable period, 50 to 100
23 years. This means that costs and performance can be
24 more accurately determined, thus ensuring safety
25 standards are met.



1 It would ensure consistency of licensing
2 approach across all nuclear facilities which produce
3 wastes. This is important to ensure that true costs,
4 social as well as economic, of the nuclear fuel cycle
5 are defined.

6 It would provide confidence that disposal
7 could actually be accomplished both from a technical and
8 socio-economic perspective.

9 Although international measures for
10 safeguarding fuel in a closed disposal facility have not
11 yet been established, it is probable that IAEA safeguards
12 for a closed disposal facility would be less extensive
13 and be more effective than if the fuel is stored above
14 ground or left indefinitely in an unsealed underground
15 facility, where it is more accessible for diversion to
16 non-peaceful purposes.

17 The disadvantages of this approach are
18 that there is some scientific and considerable public
19 doubt as to whether today's knowledge is sufficient to
20 ensure safety and environmental protection for the
21 necessary length of time. There may not be any benefit
22 from any improvements acknowledged that may evolve with
23 time.

24 The cost to retrieve nuclear fuel would be
25 relatively high if a decision was later to reprocess it.



1 With respect to the second option, the
2 advantages of storage of irradiated nuclear fuel for an
3 indefinite period are that it leaves more choice for
4 future generations to select energy options because
5 spent fuel would be available in a readily retrievable
6 form for reprocessing.

7 A large expenditure of capital for a
8 disposal facility can be deferred indefinitely.

9 It allows maximum flexibility for both the
10 operator and decision makers by delaying decisions until
11 more information becomes available in the future and to
12 take account of new circumstances.

13 It allows time for technology to improve
14 and, possibly, for a reduction in the controversy and
15 social uncertainty regarding the disposal option.

16 The disadvantages to this approach are
17 that it leaves open a question as to how and whether the
18 safety of future generations will be adequately
19 protected.

20 It is an open ended process which could
21 allow wastes to be forgotten and cause safety, serious
22 safety and environmental impacts in the future.

23 Active monitoring, security and
24 maintenance would be needed which are inherently less
25 reliable than passive measures in the long-term.



1 There is technical uncertainty with
2 respect to how long the fuel would remain stable and
3 relatively easy to handle and store.

4 Since surface facilities are more subject
5 to intrusion and other natural and man-made disruptive
6 effects then underground facilities.

7 This approach would transfer
8 responsibility for final disposal to future generations
9 and also raises the issue as to whether this is morally
10 acceptable.

11 It would perpetuated public doubt that
12 high level wastes can actually be disposed of safely and
13 could intensify opposition to the nuclear power option.

14 Nuclear material in storage would be more
15 accessible for diversion to non-peaceful purposes and
16 would probably require more extensive IAEA safeguards
17 inspections than in a closed disposal facility.

18 The advantages of developing a
19 demonstration facility are that it would have many of
20 the advantages of the disposal option, particularly with
21 respect to establishing confidence that a proven
22 disposal option is available.

23 It results in a lower investment cost than
24 the disposal option.

25 It leaves more choice for future



1 generations to select energy options because the fuel
2 can still be available in a readily retrievable form for
3 reprocessing, for at least as long as nuclear fuel can
4 be safely stored.

5 It could provide a lead period of decades
6 for a few centuries to monitor the performance of the
7 high level waste facility before the bulk of fuel wastes
8 are actually committed to disposal; any advances in
9 knowledge during that period could be factored into the
10 final design.

11 If most of the fuel were stored in an
12 underground facility, even in a readily retrievable
13 form, there would probably be a substantial protection
14 in the event that all knowledge of the facility were
15 lost.

16 The disadvantages of this approach are
17 there is still a substantial investment cost.

18 There is still a risk that social upset
19 may result in loss of knowledge of the waste fuel when
20 there is less than the desirable degree of protection.

21 Most fuel would be more readily accessible
22 for diversion to non-peaceful purposes than in the
23 disposal option.

24 Because of the fundamental nature of the
25 strategy issue it deserves careful attention. The



1 resolution of this issue could have an important effect
2 on how the rest of the review is conducted because it
3 could affect the responsibilities of the various parties
4 involved in the disposal of the fuel wastes.

5 The momentum that has been gained towards
6 establishing a program for the disposal of nuclear fuel
7 wastes must be maintained after the concept assessment
8 has been completed. The Panel should consider the
9 nature of such a program and how it could be
10 implemented.

11 The second issue that we identified is the
12 question of what standards will be used by the Panel to
13 assess the concept for disposal of spent nuclear fuel.

14 Any review of AECL's concept should be
15 done against some standare. If the Panel intends to use
16 its own judgment it should state the standard on which
17 the judgment is based.

18 AECB Reggulatory Documents contain
19 principles and criteria for the disposal of long-lived
20 radioactive wastes, including nuclear fuel wastes. The
21 relevant Regulatory Documents are R-71, R-72, R-90 and
22 R-104, copies of which have been supplied to the panel.
23 The first part of the current version of R-71 is out of
24 date and should be disregarded. This document is in the
25 process of being revised. Any disposal facility will



1 eventually have to meet AECB standards respecting
2 health, safety, security, international safeguards and
3 protection of the environment. Therefore the Panel is
4 invited to use the AECB Regulatory Documents as a basis
5 for its review. The AECB would welcome suggestions on
6 ways to improve or augment these documents and on ways
7 to facilitate their use.

8 The third issue is whether assurance of
9 long-term safety can be achieved prior to operating a
10 repository.

11 No spent nuclear fuel repository has yet
12 been built or operated anywhere in the world. Thus
13 there is not yet a practical demonstration of the long-
14 or the short-term performance of such a repository to
15 reference. Also the very long time frame needed to
16 ensure safety precluded any meaningful long-term
17 feedback from repositories by direct observation. This
18 means that confidence in repository performance must be
19 obtained using other means such as predictive modeling
20 in comparison with natural geological systems. Details
21 of the AECB perspective of this issue are contained in
22 the Regulatory Policy documents referred to earlier.
23 However, a few key concepts are highlighted in the
24 following recommendations.

25 The Panel should require that the EIS



1 meets all parts of the regulatory requirements and in
2 addition should check whether the EIS is focused on the
3 critical factors affecting health, safety and
4 environmental protection;

5 The EIS embodies a variety of techniques
6 and uses varying levels of detail to predict repository
7 performance;

8 The EIS demonstrates that information
9 needed for future siting and licensing decisions is
10 either available or can be practically obtained;

11 The EIS demonstrates that the concept
12 assessment has been done in a manner which is usable for
13 future decision-making;

14 Finally, the conclusions of the EIS are
15 supported by other natural or international studies and
16 opinion.

17 Obviously, a successful concept assessment
18 would go a long way to assuring that future generations
19 will not be saddled with an unmanageable problem of
20 nuclear fuel wastes, but does it go far enough? For
21 more than 30 years of regulatory experience the AECB is
22 aware of several developments, some related and some
23 unrelated to waste disposal which look good on the basis
24 of paper analysis and small-scale experiments or
25 short-term experience, but which did not live up to



1 expectations. Failures are sometimes due to factors
2 which are overlooked in development or revealed only
3 through actual experience.

4 It is appropriate to consider the
5 conclusions of previous public reviews as well as
6 international opinion. On the question of
7 responsibility to future generations and the
8 desirability of immediate disposal versus deferral and
9 long-term storage, the following comments are of
10 interest:

11 The Hare Commission stated in 1977 that:
12 "Surface disposal is unsuitable because it
13 leaves to future generations of man the
14 duty to keep watch on the dangerous
15 substances that we have left behind.
16 Furthermore, surface disposal, even if it
17 is well managed, will always be more
18 vulnerable to man-made hazards such as
19 wars, revolutions and the breakdown of
20 organized society, than disposal deep
21 underground."

22 The Porter Commission in 1980 expressed
23 the same idea in the following way:

24 "It would be unacceptable to continue to
25 generate these wastes in the absence of



1 clear progress to minimize or eliminate
2 their impact on future generations through
3 the availability of a technically credible
4 and socially acceptable nuclear waste
5 disposal facility."

6 Recently, that is in 1989, the
7 International Atomic Energy Agency published Safety
8 Series No. 99. "Safety Principles and Technical
9 Criteria for the Underground Disposal of High Level
10 Radioactive Wastes". These principles have since been
11 accepted and approved by the IAEA Board of Governors and
12 have thus general application as part of the basic
13 safety standards of that agency. In this document the
14 first principle states that:

15 "The burden on future generations shall be
16 minimized by safely disposing of high
17 level radioactive wastes at an appropriate
18 time, technical, social and economic
19 factors being taken into account."

20 It also states:

21 "Principle No. 1 concerning the
22 minimization of burdens on future
23 generations also applies that these
24 generations should not have to take any
25 action to protect themselves from the



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1 effects of waste disposal".

2 The AECB has also addressed these issues
3 in Regulatory Documents R-90 and R-104. In Regulatory
4 Document 104, Regulatory Objectives, Requirements and
5 Guidelines For The Disposal of Radioactive Wastes -
6 Long-Term Aspects, the AECB adopted a similar principle
7 which states that:

8 "The burden on future generations shall be
9 minimized by:

10 (a) selecting disposal options for
11 radioactive wastes which to the extent
12 reasonably achievable do not rely on
13 long-term institutional controls as a
14 necessary safety future.

15 (b) implementing these disposal options at
16 an appropriate time, technical, social and
17 economic factors being taken into account;
18 and

19 (c) ensuring that are no predicted future
20 risks to human health and the environment
21 that would not be currently accepted."

22 Passive measures are preferred since
23 history has shown that institutional controls and other
24 active measures are not reliable in the long-term.
25 Intrusion has occurred into wastes and land records have



1 been lost at holder sites.

2 R-104 was designed to cover all waste
3 types including uranium mine tailings and is thus worded
4 more generally than if only nuclear fuel wastes had been
5 considered. In the latter case a more definite
6 statement of the time of implementation was always
7 intended. For example, a commitment to dispose as soon
8 as a suitable site became available could have been
9 proposed.

10 Finally, Regulatory Document R-90, Policy
11 on the Decommissioning of Nuclear Facilities states
12 that:

13 "Any deferment of the decommissioning of a
14 nuclear facility must be planned and
15 justified and must not be indeterminate".

16 It also states that:

17 "reliance on institutional control
18 mechanisms which involve active on-going
19 human intervention to control the impacts
20 from decommissioned facilities is not
21 acceptable".

22 The clear thrust of all these recent
23 documents is that delays in disposing of waste should be
24 reduced to the minimum practical extent. In addition,
25 burdening future generations even with the care and



1 maintenance of nuclear fuel wastes for an indeterminate
2 period is not desirable. Recent public concern over
3 canister storage of irradiated fuel at Point Lepreau,
4 where the public learned that fuel would be stored at
5 site far longer than the ten years stated in the Lepreau
6 and Environmental Report focused on this issue.

7 The AECSB's regulatory approach puts the
8 responsibility for safe management of wastes on the
9 parties that create the wastes, that is the licensees.
10 This could be accomplished by the AECSB making a
11 regulation requiring licensees who produce the wastes to
12 develop a program to implement any necessary future
13 actions.

14 Thank you, Mr. Chairman.

15 THE CHAIRMAN: Thank you, Mr. Beare, for
16 that very comprehensive presentation of the views of the
17 Atomic Energy Control Board.

18 Questions from Members of the Panel?

19 Mr. van Vliet.

20 MR. van VLIET: Mr. Beare, you state in
21 page 10 that on the recommendations:

22 "Therefore, the panel is invited to use
23 AECSB regulatory documents as the basis for
24 its review."

25 It seemed to indicate to me that AECSB



1 which operates in the quantitative environment of
2 statements and regulations and various objectives that
3 need to be met, that the Panel should follow a similar
4 approach. I have a different view on it. I think ours
5 is less quantitative rather than subjective perhaps in
6 the final analysis and I have some difficulty with that
7 particular issue. Would you care to comment?

8 MR. BEARE: Yes, I think if you look at
9 the principles and criteria, they are fairly general in
10 nature and I think perhaps we could put it that they
11 should at least meet these. It is quite possible that
12 there are other factors involved over and above the
13 criteria that we set out.

14 So I think one of the ways you could look
15 at it is that they should meet at least these criteria.

16 MR. van VLIET: Are you limiting it to the
17 regulations as they apply in Canada as stated by the
18 AECB?

19 MR. BEARE: No, we invited comments from
20 the Panel on these criteria themselves and that would
21 include the results of your study of international work
22 as well as our own. In fact, we see the Panel as having
23 a rather -- very broad -- developing a very broad
24 approach to this problem.

25 THE CHAIRMAN: Other questions or comments



1 for Mr. Beare. Dr. Lapierre.

2 DR. LAPIERRE: On page 10 you indicate
3 that no spent fuel repository has yet been built. In
4 the following part of that you indicate that this
5 confidence in repository performance must be obtained by
6 using predictive modeling.

7 How certain are you that predictive
8 modeling can give you a reliability factor that you are
9 looking for?

10 MR. BEARE: Well, we have no opinion on
11 that because we are at the same stage of development as
12 you are in our thinking. It depends on what the review
13 of AECL's Environmental Impact Statement produces.

14 Our own work on this subject has been on
15 relatively low key to date and it is not obvious to us
16 that predictive modeling is the only answer because
17 there are some issues which lend themselves to
18 predictive modeling and some which do not. So we really
19 feel that the role of the AECEB and in fact even perhaps
20 utilities will probably begin after your Panel has
21 completed its work.

22 THE CHAIRMAN: Other questions?

23 If not, I thank you very much, Dr. Beare,
24 and your colleagues for your presentation on behalf of
25 the AECEB.



1 ---Mr. Beare withdraws

2 THE CHAIRMAN: I have one request from one
3 intervenor in addition to those who had formerly
4 requested the possibly of appearing before the Panel. I
5 would, therefore, like to call on Ms. Helen Hansen to
6 address the Panel in this meeting.

7 PRESENTATION BY MS. HANSEN:

8 Thank you for fitting me in. I am very
9 pleased that an earlier speaker from Environment Canada
10 mentioned this report called "High-Level Radioactive
11 Waste in Canada: The Eleventh Hour".

12 I would like to read just some very short
13 quotes from this report which I urge the Panel to
14 seriously consider. This was written in January '88 by
15 the Standing Committee on Environment and Forestry.

16 And it says:

17 "By the end of '87, 25 years after
18 Canada's first nuclear power plant went
19 into operation, some 12,400 metric tonnes
20 of spent fuel will be stored in our
21 various nuclear power plants. By the year
22 2000, that amount will have grown to
23 42,000 tonnes and to 100,000 tonnes in
24 2024. This takes on very great importance
25 indeed in light of the fact that there is



1 still no proven method for disposing of
2 this highly radioactive material. That
3 has merely outlined the seriousness of
4 this problem."

5 -And further, in the report, there is a
6 recommendation which states:

7 "A moratorium on the construction of
8 nuclear power plants in Canada should be
9 imposed until the people of Canada have
10 agreed on an acceptable solution for the
11 disposal of high level radioactive waste.
12 The Canadian Energy Strategy should
13 formulate alternatives that would
14 encourage a reduction in energy
15 consumption and a decrease in stress on
16 the environment from waste created by
17 various energy reducing techniques."

18 Am I here merely because I believe this
19 problem is a matter of concern of all people which was
20 stated earlier by someone, not for those who are merely
21 speaking as scientists, technicians and business people.
22 I am a citizen, environmentalist as well as a parent and
23 a grandparent and I am concerned about my children and
24 yours and I think we must all look at this very
25 seriously. Thank you.



1 THE CHAIRMAN: Thank you, Ms. Hansen.

2 Are there any questions which the Panel
3 would put; I realize that this is not a detailed
4 presentation, but drawing our attention to a report and
5 I would request if you would be so kind that you just
6 make sure that our secretariat has noted the report
7 quite clearly so we have that reference and we can look
8 back at it as well.

9 Are there any questions which the Panel
10 members would like to put to Ms. Hansen while she is
11 here. Dr. Fyfe.

12 DR. FYFE: I would just like to comment
13 that I very much appreciate your concern. I think we
14 have not taken this problem seriously. I think that
15 Canadians don't take the environmental problems
16 seriously.

17 MS. HANSEN: This Canadian does.

18 THE CHAIRMAN: Thank you very much, Ms.
19 Hansen.

20 MS. HANSEN: Thank you.

21 ---Ms. Hansen withdraws

22 THE CHAIRMAN: May I inquire whether there
23 are others who would like to make interventions before
24 we close this afternoon's session of the scoping
25 meeting?



1 If there are no others, I will close the
2 meeting now with my thanks for your attendance and your
3 participation. The meetings will resume this evening at
4 1900 hours, at 7:00 p.m. sharp, and we have so far four
5 intervenors listed and of course there may be others who
6 will come. I look forward to seeing I hope some of you
7 at least this evening at 7:00 p.m. Thank you.

8

9 ---Whereupon the hearing was adjourned at 4:40 p.m., to
10 reconvene at 7:00 p.m.

11

12 I hereby certify the foregoing to be
13 a true and accurate computerized
14 transcription of the proceedings, to
15 the best of my skill and ability.

16

17 Cynthia Ott, R.P.R.

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BUREAU FEDERAL
D'EXAMEN DES EVALUATIONS
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Date: Monday, October 22, 1990

Volume No.: I
(evening session)

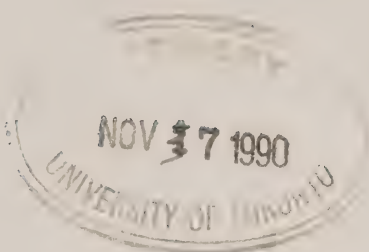
B E F O R E :

MR. BLAIR SEABORN	CHAIRMAN
DR. WILLIAM FYFE	MEMBER
MS. LOUISE ROY	MEMBER
DR. LOIS WILSON	MEMBER
DR. LOUIS LAPIERRE	MEMBER
DR. LIONEL REESE	MEMBER
MR. PIETER van VLIET	MEMBER

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HEARING BY THE FEDERAL ENVIRONMENTAL ASSESSMENT
REVIEW OFFICE ON NUCLEAR FUEL WASTE MANAGEMENT.

SCOPING MEETING

Hearing held at the St. Lawrence Hall,
King Street East, 3rd Floor, Toronto,
Ontario, on Monday, October 22, 1990,
commencing at 7:00 p.m.

VOLUME I
(Evening Session)

B E F O R E :

MR. BLAIR SEABORN	Chairman
DR. WILLIAM FYFE	Member
MS. LOUISE ROY	Member
DR. LOIS WILSON	Member
MR. PETER van VLIET	Member
DR. LIONEL REESE	Member
DR. LOUIS LaPIERRE	Member



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A P P E A R A N C E S

DR. P. BOLDRINI	Ecosystem Approach Group
NORMAN RUBIN	Energy Probe
SHAYNE SMITH BEN ROUBEN	Canadian Nuclear Society
BILL DAVIS GERRY HUNNIUS	Federation of Ontario Cottagers' Association
BETSY CARR	Private Citizen



(ii)

I N D E X O F P R O C E E D I N G S

PRESENTATION BY:

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DR. P. BOLDRINI

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NORMAN RUBIN

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SHAYNE SMITH

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BEN ROUBEN

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GERRY HUNNIUS

72

BETSY CARR

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1 ---Upon commencing at 7:03 p.m.

2 THE CHAIRMAN: Ladies and gentlemen, could
3 I ask you please to take your seats, if you are joining
4 us this evening. I will be calling in a moment or two
5 on the first participant of the evening.

6 Good evening ladies and gentlemen. Thank
7 you for coming to the resumed session of our hearings,
8 our meetings in Toronto, on nuclear waste disposal.

9 I have first on the list for this evening
10 the Ecosystem Approach Group, represented by Dr.
11 Boldrini. If he is here in the hall, we'd ask you if
12 you'd take a seat.

13 PRESENTATION BY DR. BOLDRINI:

14 Thank you, Mr. Chairman. I am glad to be
15 the after-dinner speaker.

16 In fact I will not go through my brief, I
17 will only explain the four pictures, because the four
18 pictures, I drew the four pictures.

19 The text of my presentation was checked
20 together with an ecologist, philosopher, mathematician
21 and a geneticist from one of your universities, but I am
22 responsible for the text as well. The pictures perhaps
23 tell you the story. The text should be very clear and
24 correct.

25 I am also glad to follow the lady who



1 spoke last at the one hour, hour and a half ago. The
2 message was you have forgotten the people. In fact I am
3 a chemist, and I have a career common to some of you.
4 One-third of my presentation stresses the public
5 attitude.

6 I have many books. I only brought however
7 the encyclopedia, because the public doesn't know, as I
8 do, even at the University of Western Ontario, see the
9 many books. I could see 15 on the ecosystem two days
10 ago, and I only checked one half side of the library.
11 The public, however, sometimes go to the encyclopedias.
12 And the quotes I have here are quotes that scare people.

13 So I am here to stress, on page 4, my
14 figure there is an hexagon, and I put six factors,
15 issues that concern the people. What is strange in this
16 hexagon, which that I should be what thickness don't
17 come out, only put thickness for bringing errors. It
18 stress something, the content of this hexagon are the
19 interrelations between the six, and I will go through
20 the six.

21 The six issues that the people are
22 concerned about are cultural issue. It was mentioned by
23 one speaker only, but not developed; economic issue,
24 when the people see around the economy different;
25 ethical issue, again mentioned by only one speaker;



1 political issue; social. I will not touch the
2 political, because that is not within the mandate of the
3 Panel, but the other five are cultural issue.

4 In Canada, there are people who see the
5 earthland as their mother earth. There are many other
6 people who see the land as that of mother earth as
7 fatherland. Many people in Canada, in their original
8 national ins have this word, fatherland. It is a
9 question of gender here, but the meaning is the same as
10 the motherland that some of the Canadian people use.

11 In other words, some of the people in
12 Canada will tell you the permanent repositories, like if
13 you put in my body those waste, or in the body of my
14 mother. So you've got to be careful.

15 There are cultural difficulties already,
16 built up because of the inefficient way things have been
17 carried out in the last 45 years.

18 Economy is a completely different issue
19 for the people than what is being presented.

20 Ethical; let me tell you that ethics has
21 many dimensions. There are at least 50 books in the
22 English language on environmental ethics. There however
23 are Canadian magazine, scientific magazine on ethical,
24 environmental ethics, which is not on the official list
25 of magazine, in spite of the fact it has been published



1 for the last six years, and it is very well advanced.
2 It has been printed in Vancouver. The name of this
3 magazine is Trumpeter, is advocating in fact an advance
4 point. Some of the points are more advanced even than
5 the ecosystem approach.

6 But this magazine deals with the ethical
7 issues that are forgotten here. And ethical issues
8 include responsibility with future generation -- first
9 of all, let -- first of all, it includes the exclusivity
10 with the present generation. Because I was in nuclear
11 facility area, and I generated one of my children at
12 that time with some consequences.

13 It includes other things. Ethics means,
14 for instance, and especially the relationship, the line
15 between technology and ethics, means that analyses have
16 to be what they are supposed to be, not fudge results,
17 fudge the field, as in many cases they are today and
18 nobody cares about that.

19 Social, this social, or ethics means many
20 other things, of course. Even the church has correctly
21 intervened. There is an old book which I checked two
22 days ago at the University of Western Ontario, I forgot
23 the title, where the Bishop of Exeter, 10 or 20 years
24 ago, as a chapter, churches here in Canada expressed a
25 point of view on the ethics of the problems. And the



1 people want you to take care, to listen to them.

2 The social point of view has been
3 mentioned by many people. I was glad to hear the
4 chairman of the scientific panel mentioning many of the
5 issues. He did not mention all of them.

6 What this picture represents, if you go at
7 the corner of left, technological, it means that
8 technology has relationship between social issues,
9 political issues, ethical issues, economic issues,
10 cultural issues. I am very glad, and I compliment the
11 person who chaired the scientific panel, but I suggest
12 to you that that view has to be enlarged, broadened from
13 the technological point of view. Look at the other
14 point of view as people want you to look. Look at the
15 judgment that the people give of the technology, and so
16 look at the relationship between technology in a
17 society. Forget about politicians, majority are glad
18 for that problem.

19 But don't forget about the ethic point of
20 view, don't forget about the economic and don't present
21 the supereconomic with the true economic point of view,
22 and don't forget the cultural point of view.

23 I repeat, here in Canada we are lucky,
24 depending, that we have people that think, have cultural
25 value quite different from the others. And



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1 unfortunately only the churches, and especially some
2 churches, take care of their cultural values being very
3 different from the others. I think on this issue, this
4 picture essentially is the only one which has been
5 presented without success at another meeting,
6 environmental meeting. I think that you have to take
7 care.

8 So practically speaking, perhaps, you
9 should have other panels, and I am not -- I have no
10 authority to suggest you, in addition to the scientific
11 panel, what other panel, but if you go through all these
12 lines, in fact you have five -- four more panels to see
13 things in a quite different way, or to see more things.

14 So this is what figure 1 represents. I
15 stress the point, this is the point of view what the
16 people see. It is a known ecological ecosystem
17 indicator. In my opinion, in this area is the first
18 ecosystem indicator. I mean it is the first, in spite
19 of the fact it is a known ecological. It is the first,
20 because people have carried, are carrying, will carry
21 the burden of your decision and of the past and the
22 present errors.

23 Well, an example, a further example of the
24 relationship between technology and that, what is your
25 reaction, Mr. Chairman, when you read the report of the



1 biological panel on radiations, that the last one in 5,
2 you read that the errors, many big errors were made in
3 1945 until 1980 on the calculation on the amount of
4 radiation producing genetic defects. Well, that is an
5 ethical issue. It is an issue which falls in between
6 that line. Not on either one, but it falls in between.

7 And that is an example, and that is the
8 only example I bring to you. This is not a five-,
9 six-way street, six one-way streets. These is an
10 interaction, these are content there. They are issues
11 which are not easy to classify on one close corner,
12 because they are in between. And the issue, one of them
13 is, and the technology, an error made on the
14 calculations of the effect of the -- effect of the
15 measurements, and the calculation of the models of the
16 effect of ionizing radiation.

17 Figure 2 is on page 8 expresses the second
18 major concerns of the people. This is an ecological
19 issue, an ecological indicator. Usually you see this
20 picture reversed. They speak of the foot pyramid, so
21 pyramid has the corner on top. I reverse, simply to
22 indicate that radio activity spreads very easily and
23 very quickly in the air, land, water, and all these
24 three communicated with each other, and pass this
25 radioactivity to the biotic world, which is the second



1 line, flora and fauna and includes humans evidently.

2 In this way, when it is at that stage,
3 gets biomagnified, which means concentrated. In other
4 words the food pyramids, it is a law of nature that the
5 big animals eat the smaller animals, and the biggest
6 animal, one of the biggest is man, eats the smaller
7 animals. By eating the smaller animal, we charge
8 radioactively contaminated you concentrates, and you
9 concentrate radioactivity.

10 This is one of the effect that the people
11 are concerned. Whether they express to you or whether
12 they will be able and willing to express to you, but
13 this is part of the problem. And if you advertise the
14 questions, the people will tell you, we don't want any
15 increase in the food chain. In fact if it were
16 possible, we would like to have a decrease, which is not
17 that easy, but at least we don't want an increase. And
18 that implies that Atomic Energy of Canada has to make
19 available certain groups, certain variety to each other.
20 A little bit outside of the usual model.

21 Major problems that a person born outside
22 Canada, by coming to Canada is the following: Outcome.
23 Could the reputation of Canada this making, how come
24 Canada that is the major exporter and advertises
25 plutonium in huge quantities? Plutonium, as the



1 dimension, which you will see in a moment. Does it make
2 sense? There is something there.

3 When the population got the news that
4 plutonium was being produced, in fact reprocessed, or if
5 they don't like calling reprocessed, used for the atomic
6 bomb, and for the fast breeder reactor, in spite of the
7 fact that Canada does not use plutonium for the atomic
8 and hydrogen bomb, but the fear of the people, the fear
9 comes from outside the border.

10 So you have to tolerate your people in
11 Canada scared of the hydrogen bomb by Canadian uranium.
12 It does not make sense that Atomic Energy of Canada is
13 the major producer of literature on plutonium, and
14 pushes, has been pushing plutonium as the nuclear fuel,
15 and the fear is.

16 I come to the final third of my
17 presentation, which has to do with an invitation for you
18 to ask Atomic Energy of Canada to put the ecosystem
19 approach into the environmental in that statement. I
20 will try to give you, although if you go to University
21 of Western Ontario and read any of the 15 books that are
22 there, a simple definition of ecosystem is, have you
23 heard some of the previous speaker telling you who is
24 taking care of the Canadian ecosystem? The ecosystem,
25 the Canadian ecosystem is the biotic world, Canada,



1 meaning the abiotic, inorganic, natural? That is the
2 Canada ecosystem. Biotic, abiotic component. Who takes
3 care of that?

4 And that is all inclusive, because is the
5 Canadian ecosystem. It has characteristics which are
6 not repeated anywhere in the world, the number of eggs,
7 forest, climate, thunder. This is the Canadian
8 ecosystem. A biotic world, very difficult in great
9 part, with the abiotic world against typical in that
10 part. Not only typical because of the plutonic rocks,
11 but typical for other things.

12 An ecosystem has structure and function;
13 very simple. Structure. If this is an ecosystem, it
14 has a structure, and as a structure, it has properties.
15 And the function, it has functions. And that is what I
16 tried to express in my Figure 3 on page 13, on top.

17 THE CHAIRMAN: Dr. Boldrini, excuse me,
18 I'd just remind you that you have had the floor for 15
19 minutes. I wonder if you could perhaps take us through
20 to the conclusion of this in the next minute or two?

21 DR. BOLDRINI: Yes, however I asked to be
22 given ten extra minutes, and I was granted from the
23 person, and I don't want to abuse it.

24 THE CHAIRMAN: I was not informed of that,
25 excuse me.



1 DR. BOLDRINI: I am sorry. Yes, as I was
2 also, as I told you, I was also as a guest of mine, who
3 I don't know if it is here, because he not realize, will
4 arrive late.

5 On figure 3, I expressed these two part of
6 the ecosystem, the structure on top and the functions on
7 the bottom. The structure is a very simple structure.
8 It is a radioecological cycle, is very simple. Rate of
9 waste production, decaying of waste, characterization of
10 waste, transportation, deposition of waste; very
11 straightforward structure.

12 Well, we go into a little bit of
13 complexities on the functions. The functions on figure
14 3B, there are three special functions; radioactivity is
15 produced, biological damage. These are for dimension,
16 and that is the temper of dimension. The temper of
17 dimension is that 50,000 year at the centre of the
18 figure, and that 50,000 year is not the end of the
19 plutonium, it is only taking the standard figure to the
20 outline, but that is a misleading thing, because that
21 doesn't mean the end of plutonium. Plutonium will be
22 finished being radioactive in 250,000 year. It is
23 possible that the decay is a tonnage. So 50,000 year is
24 not the end. It is an unit of time for this ecosystem.
25 You ever to consider the time life of radioactivity, of



1 radioactive waste. Because the ecosystem considered the
2 time, the space variable and the time variable, and that
3 is the reason for putting those 50,000 year as the time
4 unit.

5 And finally on figure 4, I have kind of
6 repetition of figure 3B. I have the structure,
7 characteristic, diamond shape, and I have the four
8 functions in the errors.

9 As my conclusion, I suggest here in my
10 brief a few ecosystem indicators, some of them are
11 listed from one to nine. There are many more. There
12 are some others suggested here.

13 And my conclusion is, Mr. Chairman, I
14 would like you to ask Atomic Energy of Canada to
15 present, considering their environmental assessment, the
16 ecosystem approach, which is defined by several hundred
17 books, which I didn't report here. You don't have
18 difficulty in documenting that point, and you don't have
19 difficulty also in finding where this ecosystem approach
20 indicates of radioactive waste has been studied, because
21 it has been studied in many other cases.

22 I invite you to include in the ecosystem
23 approach, to put first, not one of -- everyone tells you
24 about the social economical issues. I don't like that.
25 I don't like that, because it exclude the ethical and



1 the cultural issue. I insist in saying that the
2 attitude of the public should be put first, because the
3 public has the impression that we are at the end of the
4 road here, and it is the function of Atomic Energy of
5 Canada to tell the public that nuclear fuel waste is
6 still a solution. But because the impression that we
7 have reached the end of the road and we should not
8 produce anymore, and that be the first step to take care
9 of the nuclear fuel waste. I don't know if the last
10 idea is clear. If you want, I can clarify it, but I
11 would be glad to answer any questions, and I hope I
12 haven't been disruptive for the after-dinner session.

13 THE CHAIRMAN: Not in the least. We are
14 always glad to have these presentations, new approaches
15 to stimulate our minds.

16 Are there any questions which the Panel
17 members would like to present to Dr. Boldrini? I think
18 all of us will want to read the presentation, along with
19 your oral presentation, the paper, of course.

20 DR. FYFE: In your paper, the "et al", who
21 are the "et al"?

22 DR. BOLDRINI: You want the name? Well,
23 one, the second name, he did not want to appear, is Dr.
24 Golinga (phonetic). I don't know if Dr. Golinga, he's
25 an ecologist, is here in the room. That is one.



1 The philosopher is Mrs. Mercerol, the
2 mathematician is Mrs. Young, Joanne Young. I hate to
3 tell you who the geneticist is, because he's at your
4 university.

5 DR. FYFE: That is okay. Thank you. I
6 just wanted an idea of what the spectrum was. Thank
7 you.

8 THE CHAIRMAN: Any other questions?

9 No further questions from the Panel.
10 Thank you, and we will take your paper and we'll have a
11 chance to read it later and give it our attention.
12 Thank you.

13 ---Dr. Boldrini withdraws

14 THE CHAIRMAN: I would call next on Energy
15 Probe. Mr. Norman Rubin is here to speak on behalf of
16 that organization.

17 PRESENTATION BY MR. RUBIN:

18 Thank you, Mr. Chairman. You have in
19 front of you, or will momentarily, notes on my
20 presentation, which I may take as read and spend time
21 elaborating.

22 This is not planned as my final submission
23 on this scope, and I'm going to chase you around the
24 country with further paper over the next week or two.

25 You can, if you like, skip to the first



1 page and a bit, which is putting down on paper for the
2 record a number of criticisms which I say
3 environmentalists have made largely elsewhere as well,
4 with the terms of reference, which I understand are
5 beyond your control; with the short deadlines, I don't
6 know whose control those are in; and with the small
7 budget, which I understand is under Atomic Energy of
8 Canada Ltd's. control. The budget for the hearing and
9 specifically for intervenor funding.

10 Also, to express one more gripe, which is
11 the decision of the funding panel not to permit funding
12 for expert consultants to intervenors, and I believe
13 that was a mistake, and in fact I spent a page or so in
14 my original application explaining why outside expertise
15 was in fact important to this process.

16 The main reason, as I indicate on this
17 piece of paper, is that I believe this process has some
18 things to learn from the experience of others in other
19 jurisdictions. There have been a number of other
20 places, including our neighbors to the south, that have
21 in some ways proceeded more quickly or sooner than we
22 have in high level waste disposal. I'm not saying they
23 are going to arrive sooner, but I think they have
24 started sooner, and they have done a number of things
25 that we have not begun doing yet in this country, like



1 picking a site, for example.

2 As a result, they have generated a large
3 amount of heat, I think all sides can agree on that.
4 They have also generated a lot of opinions and expert
5 opinions on how they should have proceeded and why, for
6 example, the DOE program to dispose of nuclear waste in
7 the upper mountain came to a major crisis at the end of
8 1989, that led to the projection of most of the work
9 that had been done to date on that project.

10 Anyway, there are bodies of opinion in
11 Nevada State and Wisconsin State governments that I
12 think could profitably be brought to bear on your
13 decisions, including your scoping and guidelines
14 decisions.

15 I have no doubt that Atomic Energy of
16 Canada Ltd. is consulting and has consulted over the
17 years extensively with other proponents, and I believe
18 the Panel could have profited from extensive
19 consultation between Canadian critics and other critics.
20 In effect that opportunity was, if not totally removed
21 from us, at least it was greatly diminished, and I
22 believe the process itself is likely to be a victim.

23 Starting on page 2, I am sorry I didn't
24 number the pages, but there are five; move forward a
25 bit. Starting on the second page, I have a list of



1 issues to be included in the scoping guidelines. One of
2 the advantages of separating concept from siting or from
3 physical repository from the assessment of an actual
4 proposal, and I hasten to add that there are
5 disadvantages as well, but one of the advantages is that
6 it should be possible to establish minimum criteria in a
7 number of areas for site selection. It should be
8 easier, before looking at a piece of rock, to decide in
9 the abstract what the minimum criteria the piece of rock
10 must have, in order to be the kind of piece of rock we
11 should pursue farther.

12 The program in the States, for example,
13 has been criticized widely. One of my favorite
14 characterizations of the criticism is that the program
15 has been characterized by shooting an arrow, watching
16 where it lands and drawing a bull's-eye around that
17 spot, and that is the -- obviously a character of
18 critics, but the critics have been caricaturing the fact
19 that there are no firm, drop-dead criteria, no rejection
20 criteria which aren't later maluable, when they find out
21 that the site that they have chosen early on and have
22 become psychologically married to doesn't in fact meet
23 some of there "wouldn't it be nice if" criteria.

24 We at this point, as far as we know, even
25 the proponent has not married or even proposed to any



1 physical site, and therefore it should be relatively
2 easy to decide on preferably multiple rejection
3 criteria, screening criteria, if you will. I believe
4 that multiple criteria, in fact, are the way to go.

5 One of the problems in the States that has
6 diminished the credibility of the program, according to
7 the people I have contacted, is that the DOE, the
8 Department of Energy, which is the proponent down there,
9 as well as one of the major waste makers, and the
10 proponent of expanding nuclear industry, which is a
11 perceived conflict of interest, which I will get back
12 to, because we share a great deal of that conflict, but
13 one of the problems there is that the proponent keeps in
14 effect skipping to the bottom line. Says that the only
15 thing that matters is the best estimate of the dose to
16 the public, or the dose to the most exposed public or
17 some one single performance criterion.

18 Therefore, if they started out looking for
19 a dry site and they find a wet site, they can say well,
20 by putting in this kind of waterproofing and this kind
21 of plastic bag, we can bring the ultimate calculated
22 results back in line with what they would have been in a
23 dry site. They can continually compensate for bad news
24 along the way by throwing one more plastic bag, as it
25 were, around the waste, which will by another order of



1 magnitude or whatever, protection for however many
2 years.

3 That approach basically has generated
4 distrust, especially given the state of confidence that
5 we can have in the bottom line. That is even over
6 relatively short time horizon, like 10,000 years,
7 relatively short compared to the length of time, the
8 lifetime of some of the new clients, relative even to
9 the estimated peak in public exposure from repository in
10 a number of model studies that I have seen where the
11 peaks come at or after a million years after closure of
12 a repository.

13 But even within say the first 10,000
14 years, we are obviously facing a combined uncertainty in
15 the performance of this repository that is enormous.
16 And if one adds to the calculated uncertainty that the
17 modelers are going to present to you, if one adds to
18 that the uncertainty that the modelers got it right in
19 the first place, then we have a total uncertainty all
20 added together that is, I would say, extremely large and
21 perhaps large to the point of not knowing much at all.

22 My second bullet I mention total
23 population exposure to radiation, total premature
24 deaths, and some attempt to put confidence limits or
25 uncertainty limits around that. The Atomic Energy



1 Control Board, as you may know, has so far omitted
2 population dose as a criterion for a waste disposal
3 site. In their regulatory documents they list
4 individual dose levels and suggest that a concept or a
5 repository should have 95 per cent confidence of keeping
6 future doses to the most exposed individuals of legal by
7 1989 standards, and that that should be more or less
8 good enough. Maybe we can do better, but that is
9 approximate.

10 I would suggest that 90 to 95 per cent of
11 today's normal limits is an acceptable number in my
12 view, but that whatever numbers we choose for that, in
13 addition one must, I believe, ask a very basic question,
14 which I believe my next-door neighbors on both sides
15 would want to know for approving this project, and that
16 is how much harm do we think it is going to do? Not is
17 the risk to each individual, but there are billions of
18 individuals. You know, is that individual risk large
19 enough to be worth crossing the street to avoid. That
20 is another kind of question.

21 But when you add all of it together, how
22 many people do you think we are going to kill by doing
23 this thing? Is, as I'm sure all of you know, is one of
24 the key criteria of the U.S. program, for example, and
25 has been criticized, their criterion, as you may know,



1 is not more than 1,000 excess premature deaths in the
2 first 10,000 years of the economic repository, and they
3 have already been criticized from a number of quarters
4 for having set an unrealistically tough test, a test
5 which in fact science cannot satisfy, and that they are
6 doomed to fail.

7 We don't know that they are going to fail
8 for sure, but a thousand deaths is a lot of deaths for
9 most of us, and most of us do not accomplish that on our
10 worst projects. But this facility might, and the
11 facility in the States might. And yet even that level
12 of confidence may not be available, given the state of
13 today's science, today's knowledge base.

14 One of those, one of the questions I
15 involved in trying to get a hold of the limited
16 confidence that human knowledge can now give us in this
17 field, and the relatively high level of confidence that
18 I think a lot of us would want before moving the waste
19 out of our site irretrievably, and I am not sure I
20 actually included the word irretrievable or
21 irretrievably as often as I should have in this
22 particular document, but it is a key word in all of
23 this. I forget the name of the author who said
24 everything I need to know I learned in kindergarten, but
25 one of the things I learned early on is don't do



1 anything I can't undo. Don't break anything I can't
2 fix.

3 I think that is a relatively sound
4 principle here that we should at the very least compare
5 the risks of keeping the wastes where they are now for
6 the time being, while we continue on the learning curve
7 in all the relevant fields, including, I might add,
8 participatory democracy, which is I think a field we are
9 still learning.

10 Continuing to learn while we keep our eyes
11 on the waves, as opposed to putting them out of site,
12 out of mind in a way that we are relatively confident
13 will be relatively safe or relatively for a long time,
14 God willing. Those two things obviously have to be
15 traded against each other in the case of existing waste.
16 In the case of future waste, of course I would like to
17 apply the first R, and I understand you are not allowed
18 to hear that, because it is ruled out in terms of
19 reference, and I'm sympathetic.

20 So in that field, in that kind of a field,
21 I would maintain that there is a great burden, greater
22 than in perhaps any other kind of environmental
23 assessment view. A great burden on the process by which
24 the answer is arrived at. The kind of science that is
25 being done, the kind of process that is doing the trade



1 offs. And I don't frankly think it is realistic to
2 expect a FEARO hearing to bear the brunt of that kind of
3 responsibility for a project of this size, even a
4 five-year FEARO hearing.

5 I think, therefore, one of the things that
6 this FEARO hearing should zero in on is in effect not
7 just whether AECL's concept of geological disposal is
8 acceptable, but whether the concept is acceptable of
9 AECL disposing of high-level waste.

10 In other words, if you were going to set
11 up a process in which you could have confidence that the
12 best scientific answer we can come up with will in fact
13 be come up with, would that be at Atomic Energy of
14 Canada Ltd.? Would you choose an agency that
15 approximately twenty years ago declared that this was
16 not a technical problem, it was a public relations
17 problem? Would you give them the job of solving the
18 technical problems?

19 Would you give the main nuclear proponent
20 agency of the federal government the job of
21 communicating whatever scientific consensus might be
22 reached to the Canadian public, of building whatever
23 consensus we are going to need in the public, if in fact
24 we are going to proceed with a repository, without
25 tearing social factors apart?



1 In other words, does Atomic Energy of
2 Canada Ltd. now, or will they in the near future, or
3 within the next several decades, have the credibility to
4 establish that what they think is safe is safe, to the
5 satisfaction of the Canadian public? And I want to
6 separate that from the question of whether in fact what
7 they are trying to convince people of is true or not,
8 and I think those are separable problems. They are both
9 problems.

10 The whether it is true or not is a
11 problem, because, as I was trained at MIT, in order for
12 science to come up with the right answer, it must be
13 done in a spirit of skepticism, in a spirit of critical
14 thought.

15 What that means to me is that the workers'
16 in the trenches must be convinced in their heart of
17 hearts that it will go better for them if they shoot the
18 hypothesis down, than if they sustain it, and woe be to
19 them if they sustain it, and it is later shot down, and
20 they missed the flaw. You know, that is precisely the
21 critical atmosphere in which ideas can be tested, and if
22 an idea survives that test, we can have some confidence
23 that it is the best we can do today.

24 Of course it may still be 180 degrees and
25 100 per cent wrong, and I don't know what the current



1 estimates are for how much in the latest science
2 magazine will be found in the next 40 years be false,
3 but it is a fairly high percentage, judging by our track
4 record so far. But nonetheless, that is the way science
5 must work, if we are going to be confident that we have
6 done the best that a fallible species like ours can do.

7 And then we get to the second part of that
8 question. If Atomic Energy of Canada Ltd. could in fact
9 establish that corporate culture, that scientific
10 climate, and I personally find that very hard to
11 believe, but if they could, to come up with the best
12 human answer, will anybody in the public believe that
13 they have done it?

14 This is a problem in a sense for all of us
15 who would like to be able to walk away from a problem of
16 nuclear waste. I am one of them. I won't say that all
17 of my colleagues in the anti-nuclear environmental
18 movement are. I think there are those who relish the
19 idea that Atomic Energy of Canada Ltd. and their
20 industry still has its waste staring them in their face.
21 I am not one of them.

22 I think existing wastes for sure are a
23 problem, and it would be very nice to be able to come up
24 with a solution we have confidence in. But I'm not sure
25 we can do that, with this proponent coming up with a



1 concept tested by a process that they first called
2 concept verification, and then rephrased it later, after
3 being criticized, to concept assessment.

4 You know, I don't think that is the kind
5 of culture that even tested by a panel such as
6 yourselves can then be considered to cover the ground.
7 Of course, there is more, after the concept is approved,
8 modified or rejected, there will obviously be more
9 research.

10 You know, the job won't be done when your
11 work is done. And the question is who is then going to
12 carry the ball for the rest of the way? And I would
13 say, and again there are strong parallels in the U.S.,
14 where one of the problems with the program is that
15 nobody believes the Department of Energy when they are
16 telling the truth. There may be a few people who
17 believe them when they fib cleverly, but nobody believes
18 them even when they are telling the truth.

19 They would have to open their doors
20 completely forever, in effect, to get rid of the stigma
21 of who they have been over the last several decades, and
22 what their role is, among other things, in the
23 manufacture of the waste.

24 If somebody has an interest in making
25 wastes and building factories that build waste, such



1 that this unsolved problem is a public relations
2 problem, and I will maintain that Atomic Energy of
3 Canada Ltd. got that half of the statement right, this
4 is a public relations problem for them, then the
5 question is, given that by digging a hole and throwing
6 it down, they will solve that public relations problem,
7 whatever else happens, at least for the time being, are
8 they able to communicate this, and of course the other
9 question, are they in fact the people to solve the
10 problems?

11 I have a number of specific points for
12 trying to test for that corporate culture, trying to
13 test for whether there has been a kind of higher litmus
14 test at AECL, such that unless you are a true believe in
15 their religion, you can't work on this program. There
16 are a number of tests here which I believe are in the
17 purview of this hearing. And if they are not, I think
18 this process is in trouble.

19 I have a number of points dealing with
20 alternatives, which I believe are also legally within
21 your terms of reference. A couple of process points on
22 the top of my fourth page, I believe it is, top of the
23 penultimate page, having to do with the choice of
24 crystal and granite, as opposed to, for example, shale.

25 A couple of points later on page 4; I talk



1 about the comparison between deep geological disposal,
2 and I urge you to urge AECL to talk about the comparison
3 between deep geological disposal, which Atomic Energy of
4 Canada Ltd. now advocates, with indefinite modern
5 surface storage, which AECL used to advocate.

6 The question is are they right now? Were
7 they right then? Did the world change? Did they
8 change? Was it technical things that changed? Was it
9 public relations that changed? The related point, my
10 sixth bullet on the fourth page, does AECL and does the
11 Panel consider indefinite monitoring surface storage an
12 acceptable solution?

13 This is tied in closely to the following
14 point, which is, at what rate are the disciplines that
15 we are depending on to answer these questions acquiring
16 new information, and, by the way, discarding old
17 information? In other words, how many years ago was it,
18 for example, that we thought that there were no plates
19 that moved on the surface of the earth, and those who
20 thought there were an ostracized minority of the
21 geological profession.

22 We have now learned that there are
23 technomic plates. I'm going back something in the order
24 of two, three decades. What are we going to find out in
25 the next two or three decades? Is the pace of learning



1 about where earthquakes occur accelerating, or is it
2 slowing down? And has this been factored into account
3 in deciding whether there is a hurry or not in finding
4 the hole and putting waste in it?

5 You know, Saguenay, where the late 1988
6 earthquake happened, to the surprise of every geologist
7 I have ever spoken to, might have looked at the time
8 like a good spot for a nuclear waste depository. It
9 certainly was on nobody's list of the top five or ten
10 spots for a major earthquake, for the largest earthquake
11 in North America since 1935. Thank God we weren't in
12 such a rush that we missed something there.

13 Where is the next one going to be?
14 Obviously geologists can't really tell us that. They
15 can tell us some spots where they think eventually there
16 will be one, but they can't tell us for sure, as I
17 understand, or spots where they are sure there won't be
18 any. My impression from reading a little bit of the
19 literature is that the eastern Canadian Shield is in
20 fact more poorly understood from a seismic point of view
21 than most types of rock.

22 These may be problems that can be
23 overcome, but what I believe does make sense is that we
24 are learning fast in these fields that the geology of
25 worthless rock, which is basically what we are



1 determined to study in order to dispose of nuclear
2 waste, the geology of worthless rock is a relatively
3 recent science and a relatively fast-moving science.
4 But yet, you know, it is hard to know when you have
5 reached closure on it, when enough is enough.

6 But it is hard for me to believe that
7 there can't be earthquakes in worthless rock, when
8 geology clearly is not a predictive science. It seems
9 premature to say that we have reached that closure, and
10 it is now time to do something irretrievable.

11 I have taken a couple of cuts in this
12 brief document at trying to get some handle on how to
13 quantify probabilities in the models, what sorts of
14 probabilistic questions might be asked, as well as
15 trying to test a number of things that can be decided
16 without reference to probabilities.

17 A number of things can be done to
18 determine whether wet is bad. Within so many feet of a
19 public source of groundwater, it is out. There may be a
20 bunch of criteria that we can all agree, including AECL,
21 are rejection criteria, but we are going to be stuck, I
22 believe, in this exercise with significant reference to
23 Monte Carlo models or to probabilistic outputs from
24 electronic devices, the probability of whose accuracy is
25 itself not known, or at least the probability of whose



1 program's accuracy is not known.

2 I have actually suggested, in one of my
3 points, a review of the accuracy of past models and past
4 model runs from Atomic Energy of Canada Ltd. I have
5 mentioned one of my favorite modeling errors that I know
6 they have made, when they assured us shortly before the
7 1983 pressure rupture that it wouldn't happen. And I'm
8 wondering what lessons we will learn. That was a
9 modeling exercise. They had some information,
10 obviously, and from that they built a model of how
11 pressure tubes operate, and they came up with the
12 conclusions they expressed with great confidence that
13 turned out, in hindsight, to be wrong.

14 I'm not using this as an excuse to vilify
15 anybody. The Board knows I have been wrong, too. And I
16 suspect everybody in the room has been. That is not the
17 issue. The question is how does one re-jig at least
18 one's confidence level, or at least one's public
19 statements of confidence, after one expresses great
20 confidence and something then turns out to be wrong.

21 THE CHAIRMAN: Mr. Rubin, I am sorry to
22 interrupt you, because you are posing a lot of very
23 interesting and very difficult questions, but I must
24 remind you that you have passed the 25 minutes.

25 MR. RUBIN: You are quite right. I'm just



1 passed it.

2 I think the rest of this document probably
3 speaks for itself, and as I said, I hope to pass it up,
4 add to it with more.

5 The final comment, there are some
6 indications that ground water flow, at least under some
7 circumstances, is chaotic, which would make this
8 whole -- a lot of the science perhaps impossible to do
9 at the present time.

10 That is my presentation now.

11 THE CHAIRMAN: I want to make sure that I
12 give panel opportunities for the Panel to ask any
13 questions of you, in reaction to the many points you
14 brought up.

15 We are open for questions at this stage.
16 Is there anything which, at this stage that we have had
17 a chance to focus on the points, that the Panel would
18 wish to put to Mr. Rubin, while he's here before us
19 today? Ms. Roy?

20 MS. ROY: On the second page of your
21 paper, you are saying -- that is the fourth little
22 square. Is risk probability, multiplied by the
23 consequence, an appropriate or useful construct for
24 judging the risk or the acceptability of the risk of a
25 geological nuclear waste repository? And as the second



1 part of the question that is interesting me very much,
2 how can the acceptability of these risks to today's
3 public and the future generation and to the non-human
4 environment best be assessed.

5 Could you help us a little more? Do you
6 have some key references to give us? How could this be
7 assessed from today's public point of view, to the
8 non-human environment? If we tried to make a first
9 step, what should it be?

10 MR. RUBIN: I think some of these are
11 easier than others. I should point out a perhaps
12 professional bias. I am a member of another --
13 associations of the Advisory Committee to the Waterloo
14 University Institute for Risk Research. I spend a lot
15 of time thinking about risk, and I published a couple of
16 papers on this.

17 My own view is that, as far as the first
18 part of this bullet goes, that multiplying probability,
19 best guess probabilities times best guess consequences
20 of a bad event, and assigning the word risk to that
21 product is one of the dumbest things I have ever learned
22 at MIT, and I'm embarrassed to have been taught it,
23 because I think there is very little wisdom in it, when
24 the questions get interesting.

25 We have probability gets low, cost



1 estimates get high, time frames get long whenever the
2 thing is interesting. I find that, you know, unless you
3 are betting nickels on Friday night poker or something,
4 I just find that that equation does more harm than good,
5 and it is more misleading than helpful.

6 My best suggestion for assessing the
7 acceptability of any risk to today's public is to ask
8 them. I don't think any method has been devised in the
9 field of risk communication or risk assessment that can
10 hold a candle to asking people whether in fact they are
11 willing to accept a risk.

12 Now unfortunately that is not available
13 for future generations, and I guess the reason I'm
14 suggesting that this be a scoping question is not
15 because I have already an answer to it, but because I
16 think the answer to the acceptability of this
17 undertaking will depend in part on what AECL's answer
18 and your answer is.

19 In other words, if indeed it is true that
20 the shape of the risk curve to individuals, that is the
21 shape of the dose curve, peaks at something, let's say
22 after a million years, and I have a couple of graphs
23 with me that indicate that the latest research of a
24 number of modelers indicates that that is in fact likely
25 for a nuclear repository.



1 Then how do you decide how much that
2 exposure a million years from now is worth? What
3 assumptions do you use about how many people are going
4 to be around to be exposed in a million years? You
5 know, the entire cost, if you will. Not financial cost
6 but the eventual human cost of the undertaking becomes
7 dominated by unknowable assumptions so far in the future
8 that I'm not sure any of us have the mind, you know, the
9 native people used to thing to the seventh generation,
10 that doesn't get you close to a million years. I am not
11 sure most of us think to the seventh generation often
12 enough.

13 So then the question becomes why? How,
14 you know, how does one ask the questions? I believe
15 those questions have probably been answered implicitly
16 in a number of the calculations, that is I think when --
17 or will be. Anyway, I believe that the documents in the
18 EIS, for example, in saying this is acceptable and this
19 is what we think will happen, will in effect embed some
20 assumptions about how much an exposure of one-tenth or
21 one-one thousandth of today's maximum permissible dose a
22 million years from now, you know, how much that should
23 be weighted.

24 So I'm not suggesting that is an easy
25 question; contraire. I think it is a difficult



1 question, but I think it is a question that in effect
2 must be answered on the way to a decision that this is
3 acceptable.

4 The non-human environment, of course, can
5 be viewed as something that is of value to humans, and
6 it is precisely its value to humans that we should be
7 concerned with. I think there are certainly --
8 certainly a part of the environmental movement that has
9 seen the non-human environment as being more than
10 something which humans value.

11 But we are in point new at trying to
12 quantify the importance of it. In fact the nuclear part
13 of our society, specifically the Nuclear Regulatory
14 Agency, Atomic Energy Control Board, which I believe is
15 represented here, generally does not protect the
16 environment and generally goes on the assumption, which
17 they borrow from the International Commission on
18 Ecological Protection that the environment will be
19 adequately protected if humans are protected to certain
20 levels.

21 You wouldn't want to overdo human
22 protection, because that would be a waste of money and
23 would not, you know, meet the test of authorization.
24 But leaving that aside, if you keep the dose to humans
25 below a certain reference level, so the argument goes,





1 you will probably not do unacceptable harm to the
2 environment.

3 That is not a good enough approach for
4 most environmentalists, and I hope it is not a good
5 enough approach for the Environmental Assessment Review
6 Panel, either.

7 But I don't have answers to these
8 questions on my sleeve, I just know that these are
9 questions that we have to come up with a defacto answer
10 to -- (inaudible) -- and we might as well make those
11 answers explicit, so that people can laugh or cry at
12 them later or something, so that we can at least examine
13 what our assumptions are and whether or not Atomic
14 Energy of Canada Ltd. makes the right assumptions or
15 not.

16 THE CHAIRMAN: Okay, any other panelists
17 wishing to -- Mr. Van Vliet?

18 MR. VAN VLIET: Mr. Rubin, to what extent
19 do you feel, with the proper reliances, with the extent
20 of the knowledge we have to date, having a study on the
21 large number of scientists who are reviewing modeling or
22 projections, what is your view?

23 MR. RUBIN: My opinion, and I have changed
24 it in the twelve odd years that I have worked at Energy
25 Probe, my current opinion is that we as a species don't



1 have enough knowledge to justify the improvements of
2 disposing of wastes irretrievably.

3 Now, you know, that is not my only problem
4 with this proposal from this proponent. I mean I
5 don't -- you know, as I have indicated before, I don't
6 think, you know, setting up a lab in a white shell is a
7 good way to squeeze all the juice we can out of our
8 species' knowledge. But I don't think, you know, human
9 knowledge about geology and the geochemistry and
10 groundwater flow is sufficient at present to justify
11 irretrievable storage.

12 I am confident that these are all fields
13 that are improving quickly. I am certainly hopeful that
14 I will live long enough to see geology become a
15 predictive science. I mean, you know, I'm still a
16 techni-twit by training. I'm not against science, and I
17 am not against research, and I have great hopes in the
18 expandability of our knowledge base, and I don't -- I
19 mean I wouldn't be surprised if within the next several
20 decades we get to the point where geologists can in fact
21 predict earthquakes, at least a great deal of the time.

22 I am not sure if they are going to do it
23 with, you know, if the geologists are going to do it
24 with the cockroach watchers or with what they are going
25 to do it, but I think somebody is going to know what



1 happens before an earthquake.

2 Now whether they are going to figure out
3 what happens 10,000 or 100,000 years before an
4 earthquake is another matter, but I do think we are
5 learning relatively quickly. And because of that, in
6 addition to the prudence concerned, I have a sort of a
7 concern about the opportunity cost, if we do today's
8 state of the art within 30, 50, 100 years from now,
9 state of the art will make it look so bad that we won't
10 be able to laugh at the people that did Love Canal
11 anymore, laugh or cry or whatever, because people will
12 be looking back at us and wondering how we could be so
13 primitive.

14 In other words if indeed our knowledge
15 basis is accelerating that fast, Lord knows that wastes
16 are going to be around for a long time, toxic for a long
17 time. Save in 40 or 50 years in their replacement in
18 the ground may not seem like a big deal, when the
19 experiments are over.

20 MR. VAN VLIET: It is a little like
21 binding the Commission, because that was another one
22 promised -- (inaudible) -- but if you don't ever take
23 action, you will never get anywhere. Is there a time
24 for us to say you must go quickly with the decision?

25 MR. RUBIN: I would say the decision to



1 buy a computer would be much more interesting if you
2 knew you could only buy one in your lifetime. And I
3 think many of us would have waited quite a bit longer
4 before buying our first computer, if we knew that.

5 This is not something we are going to get
6 a chance to redo every few years. I know I'm not going
7 to go down that hole to dig the waste back up.

8 MR. VAN VLIET: You are assuming there is
9 going to be one centre facility?

10 MR. RUBIN: Well, I'm assuming that the
11 first facility we build is not going to be re-excavated
12 and redesigned. In other words, I think that is
13 probably worth going through some trouble to avoid.

14 In fact, if we have a facility which
15 fails, or repository, and we monitor things in nearby
16 wells or rivers, then under those circumstances I would
17 be willing to bet that nobody is going down there, just
18 because the place will be a mess. I would say then we
19 are really going to be stuck.

20 So, you know, the rule of thumb at Energy
21 Probe was, before we bought our first computer we cost
22 had it out on the basis of, I think it was a two-year
23 pay-back period, because that was our estimate of the
24 obsolescence period. By that time it might be a piece
25 of junk even if it is working fine. So we in fact



1 demanded a fast pay back, precisely because the
2 technology is moving so fast.

3 But we knew we could buy another one,
4 unless we were completely broke. We in fact bought new
5 ones, and we still have those relics hanging around, and
6 they are relics, and people don't use them much now, but
7 we haven't lost anything, because we did in fact get our
8 two-year pay back.

9 Now the question is, I don't think anybody
10 thinks we are going to get a two-year pay back from a
11 waste dump facility, repository, excuse me, whatever.
12 And I think in effect, for the first one at least, it is
13 going to be the only time we bury those wastes. That is
14 my estimate. And we should certainly have that attitude
15 in mind. If we think, you know, this is just an
16 experiment, and we can always dig them up in a thousand
17 years, I think we are going into it with a wrong
18 attitude. So I think we should approach this as if we
19 can buy one computer ever, and then figure out. Then
20 the trade off becomes very interesting.

21 Would you wait for next year's computer?
22 And I think maybe I would, if I was going to benefit so
23 far. Gosh, they really are getting better fast, and
24 lap-tops are a lot nicer than desk-tops, and I am not
25 sure what that answer is. But I think under those



1 circumstances, with my additional one condition that you
2 can only buy one of them, you know, it is a trivial
3 example, but I think it is a close analogy over the
4 scale of one career rather and this one geological time.
5 But otherwise I think it becomes a tricky question.

6 THE CHAIRMAN: Ms. Roy?

7 MS. ROY: I'm trying to pick up some
8 underlying assumptions in your speech, and I've got two.

9 MR. RUBIN: Next thing you know, I will
10 have the duty of EIS.

11 MS. ROY: One is related to what you said.
12 While we are continuing to learn, we should keep our
13 rising existing waste. Which means to me that you are
14 suggesting that the waste should be kept on the surface.

15 MR. RUBIN: Well, certainly retrievable,
16 and I do happen to favour surface, because I think it is
17 easier to keep your eyes on all sides of something, when
18 it is not buried. I don't see the advantage of putting
19 it underground, unless the intent is to walk away from
20 it and not come back.

21 MS. ROY: Okay, the second one was related
22 to what you just said. We do not do anything we can
23 undo.

24 And there is another one. I feel it is
25 related to the level of confidence, of predicting energy



1 related to what could happen in 10,000 years.

2 Anyway, I would like you to have the
3 chance to maybe formulate one or two other items,
4 assumptions, if you want to, that could be -- spell out
5 from what you have just told us. Is there any other
6 underlying assumption that could lead us, while we will
7 try to build the EIS guidelines, that could be spelled
8 out from your presentation?

9 MR. RUBIN: Boy, it sounds like a
10 deliciously leading question, but I can't -- you don't
11 want to make that multiple choice, do you?

12 There are a number of things I mentioned
13 in, you know, in the bullets that I have.

14 MS. ROY: We can go back to the paper.

15 MR. RUBIN: Perhaps they are answered
16 there. If not, perhaps they will be answered in a
17 future submission.

18 MS. ROY: Anyway, if you don't think of
19 any, that is all right.

20 MR. RUBIN: As far as I'm concerned --
21 well, you know, let me just add a couple of words.

22 One of the questions I had in mind, while
23 trying to wrap my head around this issue for this
24 purpose, was just a hypothetical, a thought experiment,
25 where I said if I were living, you know, X thousand



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1 years hence, and I found myself thinking back to this
2 time when these people buried or didn't bury or whatever
3 nuclear waste, you know, what would I have wanted them
4 to ask? And I think that may, you know, for me that was
5 a kind of a focusing framework. Not knowing how many
6 years you are talking about is interesting.

7 As I mentioned in here, both the Nuclear
8 Waste Policy Act in the United States and the Atomic
9 Energy Control Board regulatory documents cut off their
10 explicit, quantitative modeling at 10,000 years, and
11 they do that for what is on one level a perfectly
12 reasonable reason, which is that after 10,000 years you
13 can, you know, the uncertainty still dominates
14 everything that you can prove or disprove, you know;
15 everything and nothing, you know. And in fact we can't
16 really say much that is sensible in time frames that are
17 much longer than that, with a system as complex as the
18 combination engineer, chemical, physical, geological
19 system we were planning to create under ground or trying
20 to create under ground.

21 Given that that is so, and I believe it
22 is, given that the sum of all the uncertainties and all
23 the variables compounds with complexity and with time,
24 so that by the time you get this complex a system 10,000
25 years from now, you know, as I said before, just figure



1 how many people are going to be exposed if something
2 falls up to the surface. It is obviously, on the face
3 of an answer here, your guess is as good as mine, and I
4 have no idea what your guess is. I don't know what my
5 guess is.

6 You know, figure it out whether we will be
7 more radiation sensitive as a species then or less.
8 Whether cancer will be a thing of the past or whether it
9 it will be the only disease. You know, God only knows.

10 There are some indications that cancer is
11 more potent in doing harm in the presence of other
12 carcinogens. This was in a presentation of Arthur
13 Upton, the chief of the Year Five Committee, from the
14 U.S. Academy, from the National Academy of Sciences just
15 gave in a paper at University of Toronto that I was
16 fortunate enough to hear.

17 There are a number of indications that
18 local radiation is better at causing cancer when there
19 are co-initiators present. Well, is the world a
20 thousand years from now going to have more chemical
21 carcinogens around or less? I don't know. That is a
22 hope, but how much can you put on that?

23 So anyway, just the human side, the
24 societal side of this question is completely
25 unanswerable, and it turns out the geology and, you



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1 know, the geophysics and the chemistry and a host of
2 other interactions, all this stuff, turns out not to be,
3 in the literature I have seen, much more answerable and
4 much less uncertainty.

5 Given all that is so, then how does one
6 proceed? And I believe that, you know, we are very
7 close to the bedrock of consense, values that science
8 really doesn't have much to tell us about that anymore.
9 You know, once you quantify the total of points and once
10 you say how fast it decays or how much toxicity is left
11 at X years, once you say you don't really know what's
12 going to happen, or the rock seems pretty solid, once
13 you say a few basic things of that kind, I'm not sure
14 that the answers are in the back of the book. At least
15 not the answers that matter. And I think we are left
16 with questions like prudence versus, you know, solve the
17 problem, we think it will be good enough.

18 And I think those are competing mind sets.
19 They are not -- or competing value systems. It has
20 always intrigued me that when people look to maxims for
21 guidance, they find on the one hand, look before you
22 leap; and on the other hand, he who hesitates is lost.
23 I was raised by a daddy who was very fond of both of
24 those statements, when the situation arose, but he
25 had -- he always chose which one he would refer to.



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1 I think they are competing, sensible ways
2 of looking at a situation, depending on which decision
3 you have arrived at, in terms of whether a time for
4 action or a time for getting more information and not
5 doing anything we cannot undo.

6 As I say, my tendency with putting toxins
7 into the environment, and I know I'm delving a great
8 deal in that, all the way from the hi-tech, careful
9 placement of concentrated wastes in the geological
10 shield after billions of years of research, perhaps, and
11 the dumping of toxins into the air and water. But my
12 approach to all of those is hold them back, keep them in
13 place, keep your eyes on them, while we see if there is
14 a really good solution.

15 Obviously everybody can differ on what the
16 definition of really good is. And if I said don't bury
17 the waste while we are still learning, then I misspoke.
18 I didn't mean that. I hope we can keep learning
19 forever, but I believe that we may well reach closure,
20 we may well reach a point where my next-door neighbors
21 on both sides, and my mother, if she is still around,
22 would all agree that we know enough to do it, and it
23 will be all right.

24 I just don't think we are there now. I
25 think if the public knew what I knew and what the people



1 at IHL (phonetic) knew, I think they would say not yet.
2 And I don't know when they would say go for it, but I
3 know full well that we are not ready.

4 THE CHAIRMAN: Any other questions?

5 DR. WILSON: So with the assumptions you
6 made in the statements, I suppose one of the questions
7 then you would ask right now, or thousands of years from
8 now, one of yours questions would be what is the hurry?

9 MR. RUBIN: That is true, yes. One of my
10 questions would be what is the hurry. Which is not to
11 deny that there are risks in leaving nuclear waste on
12 the surface. And I don't think those -- you know, that
13 is not zero, either. If we did that for the next
14 million years, it all surely would do significant harm.

15 So I'm not suggesting that we should store
16 them on the surface in the next million years and just
17 rebuild the canisters every 40 or 50 years. I don't
18 think that is a very good solution, either. And I
19 hasten to add that I don't think either of these
20 solutions is imbued with enough confidence to justify
21 making any more of this stuff. Especially knowing what
22 I think I know about, you know, how cost effective and
23 useful the endeavor is that is making these poisons, and
24 how long it would last for taxpayers to stop and pick it
25 up. And I'm sure you will disregard that statement,



1 because it is outside the scope of your terms of
2 reference.

3 But it is for me one of the bottom lines.
4 That while I can make -- I mean to me there are two
5 bodies of waste. And this repository, in its design,
6 will contain 100 units of waste, roughly five of which
7 exist today, and roughly 95 of which do not exist yet.
8 And those are very different things for me, and it is a
9 source of great frustration to me that the federal
10 government, in its wisdom, chose not to recognize any
11 difference between them, in giving you your margin
12 orders. Because they are different, and I think, again,
13 my next-door neighbors on both sides would understand
14 that. And we have an option, with the 95, with the
15 wastes that don't exist yet, that even I have to admit
16 we don't have the five that does exist now. And it is
17 true. So we are not all in this together for the 95.
18 We are only all in it together for the five.

19 THE CHAIRMAN: Thank you very much, Mr.
20 Rubin.

21 Oh, sorry, sorry.

22 DR. FYFE: Thank you for a very
23 interesting presentation. The wonderful thing about
24 nuclear waste is we can detect its presence.

25 MR. RUBIN: Some of us can.



1 DR. FYFE: I just was going to ask: Did
2 you say in a recent science -- (inaudible) -- ask about
3 the standard? I am just wondering. The statement was
4 very close to yours, and it is something this Panel is
5 going to have to read very carefully.

6 Thank you.

7 THE CHAIRMAN: Thank you very much,
8 indeed. You certainly have posed a number of difficult
9 questions.

10 ---Mr. Rubin withdraws

11 THE CHAIRMAN: I would like to call next
12 on Mr. Ben Rouben and Shayne Smith, who wish to make a
13 presentation. They are here on behalf of the Canadian
14 Nuclear Society, Toronto Branch.

15 PRESENTATION BY MR. SMITH:

16 Thank you. I would like to start off
17 tonight by saying it is a pleasure to be here.

18 I guess within the last hour or so I
19 thought that I was going to be introduced as a special
20 guest in the Norm Rubin show, but...

21 I'd like to really begin by introducing
22 myself. My name is Shayne Smith and my colleague's name
23 is Dr. Ben Rouben. We have come here tonight to make
24 our own personal submissions basically from our own
25 individual perspectives, but we do represent as well the



1 Canadian Nuclear Society, and I will speak in a minute
2 to give you a little bit of background on the Society,
3 if you haven't heard about us.

4 The Panel will be basically addressed by
5 several members of the Canadian Society, basically all
6 individual presentations from their own perspectives
7 throughout the hearing process. So as well we don't --
8 want to stress we don't come here representing the
9 people that work for yours.

10 CNS is a technical society that was
11 established in 1979. The main objective basically is to
12 promote exchange of knowledge in nuclear science,
13 engineering and technology. Its membership, consisting
14 of approximately 650 members, encompasses all aspects of
15 nuclear energy, uranium, fission and other nuclear
16 technologies, including occupational and environmental
17 protection, medical diagnosis and treatment,
18 radioisotopes and food preservation. As CNS members,
19 our goal in presenting this submission tonight is to
20 assist in the identification of the technical issues
21 which should be addressed in the Environmental Impact
22 Statement, and perhaps more importantly, to stress that
23 guidelines be developed for a comprehensive information
24 program to educate the public on the Environmental
25 Impact Statement related issues and implications.



1 I guess the format, because Ben and I
2 basically wrote the document jointly, I will read from
3 the presentation for the benefit of the audience and for
4 the Panel, and Ben will then read the second half of our
5 presentation.

6 To introduce; the design and construction
7 of a facility to permanently dispose of nuclear fuel is
8 an undertaking which I'm sure all of us understand
9 requires the utmost regards for the safety of this and
10 future generations. The design life of such a facility
11 is measured in terms of millennia. This is the time
12 frame that requires the prediction of material
13 properties and behaviors far beyond normal experience.

14 This uncertainty, however, must be
15 balanced an against the safety risks of alternate
16 methods of managing a growing inventory of used nuclear
17 fuel. As well, the subject of nuclear waste disposal
18 has become a cornerstone issue with respect to the
19 public perception of nuclear power. An issue that must
20 be publicly addressed with an agreed upon technical and
21 political solution.

22 In the remainder of our submission, I wish
23 to talk really about three main issues. The first two:
24 The scheduling of public information, which I will
25 discuss; and I will briefly introduce the technical and



1 related issues, and then we will continue our
2 presentation.

3 With regards to scheduling, we feel the
4 Panel should review the current schedule for the
5 Environmental Impact Statement for the preparation and
6 assess, in its view, whether this schedule is realistic.
7 If necessary, updating the schedule and guidelines
8 really should be prepared. I think certainly the public
9 feels that these exercises drag on, and a proper
10 assessment of the schedule I think is necessary.

11 With regards to public information, the
12 success in achieving public concurrence with the EIS
13 results is entirely dependent upon the manner in which
14 the final and interim findings are released, and the
15 extent to which the general public, particularly those
16 communities most likely to be associated with the
17 facility, and I know at this point it hasn't been
18 decided, but probably northern communities, and the
19 extent to which these are involved.

20 In failing to maintain an effective means
21 of communication with the public or by succumbing to
22 political pressures to stress or to ignore certain
23 facts, the environmental review process may simply
24 become a process admired by bureaucracy and devoid of
25 public faith. I think scientists and engineers are



1 beginning to realize that resolution of the nuclear
2 waste disposal issue will be accomplished by public
3 opinion, and not by an accepted value for groundwater
4 flow in granite.

5 With respect to the public information
6 issue, we feel that the Panel must assess the following
7 questions:

8 What are the most effective methods of
9 educating the public on EIS related issues, and
10 informing them of progress? How successful has the
11 environmental review process been to date in encouraging
12 public involvement? How can this be improved?

13 I know we have just completed a recent
14 series of open houses across Canada, and my
15 understanding it a great deal of money and a great deal
16 of time went into those basically open houses. But I
17 think the turn out by all respects was quite dismal. My
18 understanding was it was less than 300 people, and that
19 is across Canada. I don't feel that that is necessarily
20 indicative of reaching the public that we want to reach
21 on this issue. So I would ask the Panel to re-examine
22 the procedures and the techniques that have been used to
23 enthuse the public on this issue and get them to come
24 out to discussions such as these.

25 I think the other issue the Panel should



1 look at, this is my second point, is to what extent will
2 the public be involved and consulted prior to the formal
3 public hearings held later in the review? Presumably a
4 focused educational effort must be initiated in parallel
5 to the preparation of the EIS.

6 I think most people agree that in terms of
7 coming to a technical solution, I don't see that as the
8 major problem. I think the technical solution exists.
9 I think the problem is going to be educating the public
10 to the extent they will understand what we are saying,
11 and to the extent that they will believe what we are
12 saying.

13 In terms of technical and related issues,
14 from a technical standpoint the central issue is clearly
15 the interaction between the disposal vault and
16 understanding that there are all the associated
17 engineering barriers, being the fuel, the container, the
18 backfill and the vault medium itself.

19 The interaction between disposal vault and
20 the environment. This interaction, of course, must be
21 the major focus of the EIS. There are, however, many
22 other related issues which should be considered as well.
23 We categorize them as follows:

24 (1) Justification of the disposal vault
25 concept.



1 (2) Issues which precede the construction
2 of the disposal vault.

3 (3) Issues which pertain to geographical
4 areas not adjacent to the vault.

5 (4) Issues which pertain to the active
6 operation of the vault.

7 (5) Issues which pertain to the period of
8 time following the closing of the vault.

9 And we will discuss each of these issues
10 in turn.

11 In terms of justification of the disposal
12 vault concept, the selection of the deep burial method
13 of permanent disposal must be justified from the
14 environmental standpoint. It must be shown that the
15 environmental impact of the proposed approach is less
16 than that of other options. By opting for an
17 irretrievable disposal option, some feel that too much
18 faith will be placed in the hydrogeological assumptions
19 which govern facility performance. These concerns,
20 valid or not, must be addressed with respect to the
21 associated environmental and moral trade offs. The
22 public will want to know why this particular approach
23 has been selected in favour of above-ground monitored
24 storage of the waste.

25 As well, it is important to compare the



1 AECL concept with similar activities elsewhere in the
2 world. In countries such as Sweden, plans to
3 permanently dispose of used nuclear fuel and other high
4 level wastes, are in the advanced planning and
5 development stages.

6 I guess in this respect, I would disagree
7 with Norm Rubin when he says the technology isn't here.
8 I believe from a technical standpoint that we are in a
9 position to decide on whether or not a permanent
10 disposal of this waste is applicable and environmentally
11 acceptable. I think we can look to not only our own
12 experience, not only AECL's experience, but experience
13 elsewhere in the world with countries that have more
14 advanced projects, and I think with the combined
15 technical brain power of what has been going on in the
16 world, I think the Panel should take a serious look at
17 these efforts, and assess this concept on that basis.

18 Procedures proposed for our disposal
19 facility should be demonstrated to be consistent with
20 the world community's view of acceptable practice in
21 this regard.

22 With issues 2, 3, 4 and 5, I will give the
23 floor to Dr. Rouben, who will then summarize our points.

24 PRESENTATION BY DR. ROUBEN:

25 Good evening, panel.



1 Perhaps it is a good time here to
2 reiterate that many of the points that we have put
3 together in this submission were put together from point
4 of view of the lay public. Just a general member of the
5 public knowing little or nothing about this matter.
6 What would this member of the public like to know? What
7 are the pressing questions that affect that person in
8 trying to come to a reasonable solution to the problem?
9 So that will be evident, I think, in following the list
10 of concerns.

11 Shayne has covered the first category,
12 which is justification of the depository concept. The
13 seconds category that we identified were issues
14 preceding the construction of this repository. The
15 issues in this category are mostly of a socio-economic
16 nature, and they would affect the community of the site
17 or at the site of the repository, whether this community
18 already exists or is a new one which is established for
19 the purpose of servicing the facility.

20 Now the siting, of course, has not been
21 decided and is not within the mandate of these hearings.
22 However, we feel that the selection of the site will be
23 a very important phase, it will be an important question
24 in the future. And I think the Panel should wish to
25 have addressed, at least along main lines in a general



1 way, how selection will be made.

2 How is the selection to be determined? Of
3 course there has to be a scientific technical component,
4 but will there be a social component to this selection?
5 And how will that social component be put together?
6 What will be the process of communication, of dialogue
7 with the public? Especially the population in the area
8 of the proposed repository. Or several locations, if
9 one has to choose between several. How will the wishes
10 and consensus of the local population be ascertained?
11 How will they be taken into account in the
12 decision-making process? We don't think it is too early
13 to think of these questions, even if the siting is to be
14 decided later, exact siting.

15 And in fact what are the plans for public
16 information, public relations and the continuing
17 dialogue on a continuing basis? We really believe that
18 these matters of the public dialogue are extremely
19 important to this entire matter.

20 The third category of issues are those
21 which pertain to other geographical areas. There will
22 be a repository, according to the proposed solution, but
23 there are many issues which affect other geographical
24 areas in the country.

25 The used nuclear fuel must be transported



1 to the vicinity of the vault. This creates several
2 issues which must be addressed.

3 What will be the methods used to transport
4 the used nuclear fuel?

5 What containers will be used?

6 And how will the adequacy of these
7 containers be demonstrated?

8 How will the collaboration of the
9 communities adjacent to the transportation routes be
10 secured? We don't need to know exactly which
11 communities, but we should have a plan of action to
12 ascertain the collaboration of these communities.

13 How will the security of the shipment be
14 assured?

15 At the point of shipment of the fuel, what
16 procedures will be in place to ensure the safety of the
17 workers who will handle the fuel?

18 What will be the safety procedures for
19 transportation of the used fuel?

20 What provisions will be made for accident
21 scenarios, traffic accidents? Whether training of
22 emergency response personnel, special equipment, et
23 cetera.

24 In summary, we believe that a
25 comprehensive risk assessments of the handling and



1 transportation of the used nuclear fuel should be
2 carried out and should be part of the EIS.

3 The fourth category of issues consists of
4 those issues which pertain to the phases of construction
5 and active operation of the disposal facility. Here we
6 are dealing not only with the future but with the here
7 and now. There will be many generations involved in the
8 construction and active operation of the repository, and
9 there are many issues that affect those generations.
10 These questions are both of socio-economic and
11 environmental nature. I will give a few examples.

12 What are the anticipated economic benefits
13 or drawbacks of the proposed repository on a nearby
14 community?

15 What will be the temporary and permanent
16 jobs, what category of jobs, how many jobs?

17 For what period of time are these
18 temporary jobs available?

19 Will the communities have any special
20 incentives for being selected?

21 What indirect affects might be associated
22 with this selection?

23 What procedures will ensure an adequate
24 level of safety during the construction phase, the
25 mining?



1 How will we ensure an adequate level of
2 safety in this phase of the operation?

3 Also, when the used fuel is transferred
4 from a transportation container to a separate container
5 for permanent storage, again we'll have to assess the
6 procedures and the risks associated with this transfer.
7 And again, a risk assessment has to be done and shown to
8 believe in the EIS.

9 What are the environmental hazards arising
10 from normal handling and packaging procedures
11 associated? And again what, are the possible accident
12 scenarios that could conceivably occur?

13 Finally, the last issue is that subsequent
14 to the repository closure. Of course that period of
15 time after the repository is filled and closed will be a
16 major focus of attention of the EIS. There is no doubt
17 about that. And the Panel should be interested in
18 seeing a number of issues addressed here.

19 With respect to the scientific questions,
20 technical questions, both in the previous categories and
21 in this one, but especially in this one, because we are
22 talking about long periods of time, it is important to
23 present the scientific studies to the Panel in an
24 abbreviated but factual and unambiguous fashion.

25 We believe the Panel should wish to have



1 all the scientific information, not necessary list reams
2 and reams and volumes. It should be abbreviated and
3 factual and unambiguous, so it can be presented to the
4 public as well in that way. And the facts should be
5 both experimental evidence and the results of predictive
6 techniques, calculations and simulations. These
7 predictive techniques should be based on the most
8 advanced models in data, of course, and the
9 uncertainties and the certainties of these calculations
10 should be made clear.

11 In particular, the anticipated rates of
12 release of radioactivity to the biosphere, the
13 assessment should could cover a sufficiently long period
14 of time. We are probably talking about thousands of
15 years, but what does sufficiently long exactly mean?
16 That will have to be part of the EIS. It will have to
17 be demonstrated why we study that for that length of
18 time.

19 How will the radiation dose traceable to
20 the disposal facility compare with the natural
21 background dose, as a function of time?

22 Of course an extremely important question,
23 what is the rate of leaching of radioactivity into
24 groundwater, and from groundwater into the water table
25 as a function of time? Will the quality of the drinking



1 water be affected? To what degree, and in what time
2 frame?

3 Lastly what, are the monitoring
4 requirements for the disposal facility?

5 For how long will such monitoring activity
6 be required?

7 Who will bear the costs?

8 What procedures can be used to ensure
9 monitoring continuity?

10 How do we assure that future generations
11 are equipped with the required knowledge about the
12 location of the disposal site and of its character?

13 And if a future generation disturbs the
14 disposal site, as a result of its existence being
15 forgotten, what would be the consequences? Again, that
16 is for analysis.

17 I will summarize here by reiterating that
18 we have attempted to list in this submission in quite a
19 bit of detail the issues which are of interest in the
20 general public, we believe we would like to see
21 addressed in the Panel's guidelines for the EIS
22 preparation.

23 In conclusion, we believe that the
24 permanent disposal of used nuclear fuel is necessary,
25 and to do so now is indicative of our responsibility to



1 manage the used nuclear fuel we have generated in
2 deriving benefits of nuclear power. This issue of
3 nuclear waste disposal exists independently of other
4 concerns arising from other aspects of the nuclear fuel
5 cycle, such as nuclear plant operation or nuclear plant
6 safety.

7 We do not believe it is within the scope
8 of this environmental impact to address these other
9 issues, which in fact have already been studied by many
10 different parties. On the other hand, the Panel may
11 wish to address, and this is again for the purpose of
12 instruction and education, and to put everything in
13 perspective, to address the comparative risks on the one
14 hand, comparative risks of this concept as opposed to
15 other concepts, and as well, the comparative risks of
16 transportation and disposal of nuclear fuel, relative to
17 the transportation and disposal risks of wastes or toxic
18 wastes from other energy sectors or other industrial
19 sectors.

20 We believe as well that the environmental
21 review process, regardless of the technical conclusions,
22 will be pointless unless public dialogue, public
23 communication and education on this issue is carried out
24 effectively. It should not be ignored and it should not
25 just be carried out ineffectively. We should make sure



1 that it is carried out effectively.

2 The ability to convince the public of the
3 solution, whatever it may be, that it is sound, and that
4 permanent disposal of nuclear fuel should be implemented
5 as a decision, and the ability to convince the general
6 public is of paramount importance.

7 We appreciate the opportunity to address
8 the Nuclear Fuel Waste Management Environment Assessment
9 Panel on this matter, thank you.

10 THE CHAIRMAN: Thank you very much Messrs.
11 Smith and Rouben.

12 I would ask the Panel members if they have
13 some questions they would like to put to these
14 participants?

15 DR. LaPIERRE: One question, I guess, to
16 the presenter. The evidence suggests for general public
17 opinion.

18 DR. ROUBEN: What is the question again?

19 THE CHAIRMAN: Do you have any suggestions
20 for educating the public?

21 MR. SMITH: I guess I would mention at
22 this point that there is really a whole host of
23 opportunities open to us, and as an illustration, trying
24 to get people to the open houses, we chose to place what
25 I feel is rather smallish ads in either the classified



1 or certainly a section of the paper that people may not
2 read.

3 I think we really have to do a lot better.
4 I don't think this is a small time operation. We have
5 to get on television, we have to perhaps make special TV
6 presentations, we have to get our politicians talking,
7 we have to get people to start thinking about this
8 issue. And we are not going to do it by having, you
9 know, meetings at the St. Lawrence Hall, where basically
10 the people that show up are Ontario Hydro or AECL people
11 or people that are presenting briefs.

12 I think we really have to be creative in
13 getting a public support, in getting people to come out
14 and talk to us. I think certainly recently, if you look
15 at certainly the experience of Port Hope where you have
16 community liaison groups and things like that that have
17 gone out and basically tried to ascertain public opinion
18 on low level waste disposal issues, I think maybe you
19 can gain some suggestions from those types of groups
20 that perhaps are more experienced in getting public
21 opinion.

22 But I really think we do have to be
23 creative on this issue, and I think the Panel should
24 really consider high level media programs to try and get
25 people educated on the issue, and I don't rule out



1 special television programs.

2 Basically we are competing in a media
3 world, where people would rather watch the Simpsons than
4 think about high level radioactive waste. So when you
5 compete in that type of medium, classified ads in the
6 newspaper just don't cut it.

7 DR. ROUBEN: If I do add to that, again
8 I'm repeating myself, but presenting dry scientific data
9 is not the way to go. I think we have to be creative,
10 as Shayne says, as scientists. We have to be creative
11 in putting the facts as we see them, putting them
12 forward in a factual fashion, but one that can be
13 absorbed and understood by the general public.

14 This is not necessarily an easy thing to
15 do, but definitely we have to try that very hard. If we
16 cannot reach the general public, it will be a useless
17 process.

18 MR. SMITH: I guess just as a
19 supplementary to that, it really becomes a challenge for
20 the Panel to go out and try and give notice as much as
21 possible. The fact that this is really the ground level
22 that we are starting at, I would challenge you and
23 encourage you to get interviewed, to get as much press
24 coverage as you can, to get on television and shout
25 loudly that this is being discussed, because I really



1 think our neighbors to the south are realizing that they
2 have not involved the public in this initiative.

3 THE CHAIRMAN: Any other questions?
4 Doctor Wilson?

5 DR. WILSON: I appreciate your comments on
6 the importance of educating the public, and the ways in
7 which we need to involve them. However, I'm a little in
8 the dark as to what your agenda would be for involving
9 the public? Would it be, for example, on the
10 justification of a disposal vault concept? Because we
11 found tonight there is a consumer disagreement about
12 that. And the last statement you have here links
13 education as the ability to convince the public that the
14 disposal concept is sound, and that sounds not to me
15 like a vocation but something else. So, I'm wondering
16 what your agenda would be for education.

17 MR. SMITH: I guess in coming here today,
18 we represent a certain point of view that we are in a
19 position today to make a decision, and I don't support
20 other people who may say that we are not. But with that
21 in mind, and in terms of your role, I think you really
22 do have to take one step back.

23 We are here tonight to express our opinion
24 on what the guidelines should be. Your role in
25 developing an educational program, which I fully



1 support, is really back to basics. Let's teach people
2 what radiation is, let's teach them what acceptable
3 levels are, let's educate them on background radiation
4 levels that they are exposed to. I really don't know.

5 It is not our argument where you can just
6 basically come in midstream and say, well, assuming all
7 this is true, join us now in our description of the
8 disposal concept. If you are going to educate the
9 public, you really have to go forward and educate from
10 square one in terms of dose and risk and everything.

11 I think it is going to be quite a chore,
12 and unfortunately or fortunately, the issue of public
13 safety is dependent to a large extent on the credibility
14 of the communicator, and where that communicator can
15 tell fancy anecdotes about his university experiences,
16 childhood experiences and about his computer purchasing
17 endeavours, that captures the heart of the people, and
18 unfortunately people like myself, with not a lot of
19 public speaking experience, a technical message or what
20 I consider sound message is lost. So I really do think
21 it is a challenge to overcome media hype and try and
22 take an honest approach at education.

23 THE CHAIRMAN: Any other questions from
24 the Panel? Mr. Van Vliet.

25 MR. VAN VLIET: Dr. Rouben, you stress the



1 risk assessment over time -- (inaudible). Do we have a
2 particular model or particular methods that we should
3 suggest as to how to do the risk assessment, that you
4 will suggest to the Panel?

5 DR. ROUBEN: No, I don't have. I don't
6 work in that area, so I cannot provide a specific model,
7 a specific way of doing that. However, I don't
8 subscribe to the view that there are two too many
9 uncertainties, therefore we can do nothing, so let's do
10 nothing.

11 I think with what we have at hand now, we
12 should be able to make a proper decision, and there are
13 experts in the field are very successful, and there are
14 many experts. They can provide all the requirements. I
15 wouldn't be able to give you the details, but that is
16 not something which is not in existence, and yes, there
17 are uncertainties in many of the questions.

18 MR. VAN VLIET: So on the one hand your
19 partner says we have enough knowledge to go in, to go
20 ahead, to obtain closure in the debate, and on the other
21 hand you are saying that we have to use more risky
22 analysis. How do you relate those?

23 DR. ROUBEN: No, I didn't necessarily say
24 that you have to do more. I said that the Panel should
25 be very interested in getting all the information on the



1 risk assessment, on all aspects of the issues.

2 MR. VAN VLIET: I don't disagree with
3 that, but I want to know how you reconcile the two.

4 MR. SMITH: Maybe I should say that the
5 tools are there to make a decision. I don't purport to
6 say that all the information is there, otherwise your
7 exercise would be pointless. I think the tools are
8 there, and I think it is your job to meet with those
9 experts and gather the information for clarification.

10 THE CHAIRMAN: Thank you very much,
11 gentlemen, for your presentation this evening.

12 ---Panel withdraws

13 THE CHAIRMAN: Our final participants for
14 this evening, two representatives of the Federation of
15 Ontario Cottagers' Associations, B. Davis and G.
16 Hunnius.

17 Would you gentlemen please come forward
18 now, please?

19 PRESENTATION BY MR. HUNNIUS:

20 Members of the Panel, may I also begin by
21 introducing the association of the members, the two
22 representatives who are reporting to you today. The
23 Federation of Ontario Cottagers' Association, or FOCA
24 for short, represents approximately 50,000 families on
25 the lakes and rivers of south and north and west and



1 eastern Ontario. Both of us are directors, members of
2 the board of directors of FOCA, Mr. Bill Davis on my
3 right, and my name is Gerry Hunnius.

4 I teach environmental studies at a
5 university, but I have no expertise and claim no
6 expertise in the subject that we are discussing today.
7 My area is quite divorced from it.

8 May I start also, like Norm Rubin did,
9 with a gripe, as he called it, and it has to do with the
10 process, or more specifically with the timing. I am not
11 interested, and we are not interested in pointing the
12 finger at the guilty organization or party, but we are
13 interested to see that this error is not being
14 introduced in the second phase.

15 The dates that were allowed between the
16 receipt of the announcement that certain monies were
17 granted to an organization such as ours, and the
18 deadline for a written submission were totally
19 unrealistic.

20 In our case we received the letter two
21 days after the deadline. That might have been the fault
22 of the Post Office. I have checked that out, and it may
23 have been lost maybe three or even four weeks in the
24 mail. But even four weeks for an organization to
25 respond on a very complex matter such as this, to go



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1 through the various decision-making organs in an
2 organization, come back with a written submission,
3 really says very little about the seriousness of this
4 meeting given to participatory democracy, if you like,
5 and I hope that will be avoided in the future. It makes
6 a mockery of the process.

7 May I just read the submission? It is a
8 fairly short one. The reason it is a short one has
9 something directly to do with the remarks I have just
10 made.

11 It has been endorsed that at the October
12 15th meeting of the Federation of Ontario Cottagers'
13 Association, and expresses a number of fairly specific
14 and a few general concerns that we have and that we
15 would like to see answered in the Environmental Impact
16 Statement that is going to come to us in a year or so
17 from now.

18 The first one, I will just read them off
19 by numbers:

20 (1) We believe that the degree of the
21 environmental impact, as well as the health and safety
22 risks to employees engaged in the transportation and
23 storage of nuclear fuel waste, may well be related to
24 the expected quantity, or if you like, the volume of
25 nuclear fuel waste to be stored either "permanently" or



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1 for an intermediate period of time.

2 The words permanently are in quotation
3 marks, and I will return to that in a minute or two.

4 We therefore urge AECL to recognize the
5 policies of the government in Ontario with respect to
6 nuclear power stations and to incorporate the social and
7 political realities into their forthcoming Environmental
8 Impact Statement.

9 (2) In recognition of the need to find a
10 permanent or temporary method of storage for nuclear
11 fuel waste, we urge AECL to consider all options and to
12 provide argumentation and evidence where possible, of
13 the respective merits and problems of each.

14 This is I think the second point of our
15 presentation that has been voiced by others for us
16 tonight.

17 In particular we would like AECL to
18 provide detailed arguments and documentation for and
19 against the continued storage of nuclear fuel wastes
20 above ground. We would also like to see a detailed
21 account and evaluation of this so-called third option
22 now being investigated in Japan. It was mentioned to us
23 by spokespersons of AECL at the meeting in July in
24 Toronto.

25 (3) Request that AECL provide all



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1 interested parties with estimates of the approximate
2 cost of permanent disposal in the rock of the Canadian
3 Shield, and of continued above-ground storage. These
4 estimates to include the estimated cost of the
5 preparation of the site or sites in each option, as well
6 as the estimated annual operating costs.

7 (4) We urge AECL to provide interested
8 parties with an updated report on how other
9 jurisdictions, both within and outside the OECD, are
10 planning to handle the disposal, storage, or recycling
11 of nuclear wastes.

12 We are aware of the fact that most
13 participants have received from AECL an OECD report, but
14 it is not an up-to-date report. It does not include all
15 countries. It does not include any countries outside of
16 the OECD, for instance the Soviet Union.

17 (5) We urge AECL to provide interested
18 parties with an up-to-date list of nations committed to
19 the phasing out of nuclear power stations.

20 (6) We are concerned about the following
21 issues in detail and ask AECL to respond to these
22 concerns in there forthcoming environmental impact
23 statement:

24 Public safety and health during the
25 transportation of nuclear fuel wastes to the disposal or



1 storage site.

2 Safety and health of employees engaged in
3 the transportation of nuclear fuel wastes.

4 Safety and health of employees engaged in
5 the storage of nuclear fuel wastes.

6 We have addressed those to the AECL and
7 are aware of the fact that transportation in particular
8 is the responsibility of Ontario Hydro.

9 Security arrangements, which have been
10 mentioned by a previous speaker, security arrangements
11 at nuclear power stations and above ground storage
12 facilities.

13 To the best of our knowledge, the security
14 arrangement at above ground storage facilities at the
15 moment are to say the least very minimal.

16 In the event of the eventual storage of
17 nuclear fuel wastes deep in the rock of the Canadian
18 Shield, we would like AECL to address the question of
19 security at the storage site, and during the
20 transportation of nuclear fuel wastes to that site.

21 (7) We believe that nuclear fuel waste, in
22 the case of a permanent storage, must be accessible for
23 retrieval. We would like AECL to provide answers to the
24 following questions.

25 And I realize here, before I read them



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1 out, that the assumption has been made by a number of
2 intervenors this evening that in fact they are
3 irretrievable. That is not the impression that we were
4 given at the meeting in Toronto in July by the
5 spokesperson from AECL. I would like that cleared up.
6 Obviously we'd like to have that cleared up in the
7 following phase.

8 The four points we are raising are as
9 follows:

10 What are the expected health and safety
11 risks, in case of retrieval, for employees engaged in
12 this process?

13 What is the expected environmental impact
14 on surrounding communities?

15 What is the expected impact on the
16 surrounding environment, and on employees, in replacing
17 the containers shall we say 500 years hence? That may
18 be given to understand the approximate life span of
19 those containers.

20 What is the expected cost in retrieving
21 the nuclear fuel waste at a future date? Here we are
22 not talking about environmental or social costs, but
23 actual financial costs.

24 (8) We would like AECL to provide us with
25 an answer to the following scenario:



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1 Assuming the AECL's disposal concept is
2 implemented and an undetected leak occurs, what would be
3 the worse possible environmental and health
4 consequences? In the scientific community, that type of
5 approach is well known and frequently played out. We
6 would like AECL to provide us with such an approach.

7 And finally, in closing, let me urge AECL
8 and the Panel, in their statement, to write their
9 reports and statements in such a way that the
10 non-expert, educated lay person can understand them. It
11 is not always easy, but it can be done. I'm pointing
12 out one very good example of how it can be do done, the
13 so-called -- (inaudible) -- report, which was issued on
14 all radioactive waste. It is accessible, it is
15 understandable, but most of what the scientific
16 community sends us is not. I would urge you to write in
17 plain English.

18 Thank you very much.

19 THE CHAIRMAN: Thank you. I wonder if I
20 could ask for a clarification. I didn't quite catch the
21 point you are making, if you could refer to your point
22 7, before you got to the four subpoints. There was
23 something else, I'm sorry, I didn't quite catch it.

24 MR. HUNNIUS: No. 7?

25 THE CHAIRMAN: Yes, it is the



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1 accessibility for retrieval that you were emphasizing
2 there.

3 MR. HUNNIUS: Yes, we believe that nuclear
4 fuel waste, in the case of permanent storage, the
5 proposal by AECL, must be accessible for retrieval. Our
6 understanding is that it will be, but I'm beginning to
7 be slightly confused by the statements that have been
8 made this evening, which seem to assume that it will not
9 be accessible. If it will not be accessible, I think
10 our position to a permanent storage that is not
11 accessible at this moment will be quite a bit stronger
12 than it is at the moment.

13 THE CHAIRMAN: Thank you. I just wanted
14 to make sure I was aware of your definition there.

15 Any questions now from members of the
16 Panel?

17 If there are no follow-up questions, we
18 thank you and assure you that note needs to be taken on
19 the substantive procedural comments you have made.
20 Thank you very much.

21 ---Panel withdraws

22 THE CHAIRMAN: I have one request, so far
23 at least, from one of the people present to make an
24 additional comment in our hearings, in our meeting this
25 evening. Ms. Betsy Carr would like to address us.



1 PRESENTATION BY MS. CARR:

2 Thank you very much, Mr. Chairman. I am
3 part of a group that already made a presentation on
4 another occasion, but after sitting this afternoon, I
5 decided that I'd like to say something right now on what
6 I had heard.

7 Years of research and millions of our
8 dollars have gone into some of the series of submissions
9 this afternoon. The complicated developed arguments,
10 and generalized statements did not successfully advance
11 my understanding or confidence in the state of knowledge
12 of the management of nuclear waste.

13 Yet people who became aware of these
14 hearings during the summer had little time to gather
15 their thoughts and convictions in cohesive form. My
16 knowledge and information are growing, my convictions
17 deep deepening. I hope this hearing process is able to
18 be more than window dressing, and is really significant
19 in public and political ways.

20 This afternoon we heard some very
21 necessary questions raised by this panel scientific
22 review group. It sounds like they will receive
23 unqualified answers, and be definitive. I assume that
24 these will be very difficult to arrive at.

25 I'd like to quote Edith Fraser in the



1 Globe & Mail from May 19th, last year, "The Real Costs
2 of Nuclear Power." She speaks of Marie Curie, the
3 double Nobel prize winner who with her husband, Pierre,
4 discovered radium. And she contended that, "Nothing is
5 to be feared. It is only to be understood." That is
6 the end of the quote. Yet she understood the dangers of
7 her own discovery so little that she kept radioactive
8 samples in her desk drawer and died of leukemia.

9 Let us be careful.

10 In my own family, we have a Down's
11 syndrome child who lives not far from the Hanford
12 Washington reprocessing facility. We also have another
13 woman who suffered an unusual late spontaneous abortion
14 downwind of the Three Mile Island disaster. We wonder
15 what would be the explanations for these occurrences.

16 Then there is Elliot Lake, Ontario, in the
17 uranium mining business since the 50s, with a lung
18 cancer rate among miners 36 per cent higher than the
19 average, and metal leaching from tailings have ruined
20 ten lakes. Members of the Serpent River indian band
21 nearby have had to abandon their way of life and fish
22 rich diet.

23 Uranium at Port Hope linked to its
24 radioactive concentrations in the harbour organisms.
25 Elevated leukemia rates are reported in children and



1 birth defects are attributed by some to Pickering's
2 eight reactors released emissions.

3 Dr. Martin Gardener, of Southampton
4 University in England released his five-year study last
5 February, showing cellafailed (phonetic) reprocessing
6 workers fathering children with an eight-fold higher
7 chance of suffering leukemia. Not all this information
8 relates to nuclear waste management. But it is part of
9 the same subject, I really must insist.

10 We don't need nuclear waste. I'd like to
11 reverse the wise crack, if it ain't broke don't fix it.
12 Instead I'd like it to read, if you don't need it, don't
13 make it.

14 Thank you very much.

15 THE CHAIRMAN: Thank you, Ms. Carr.

16 Any questions of that brief but very
17 concise presentation from the Panel members?

18 Thank you very much indeed, and thank you
19 for appearing before us.

20 ---Ms. Carr withdraws

21 THE CHAIRMAN: Are there any other members
22 present who would like to make comment at this stage?

23 ---No response

24 If there are not, we will rise for this
25 evening, but the Panel will be meeting again tomorrow.



1 Some of you will be present, as well as others, in the
2 same hall, 9:00 tomorrow morning.

3 We look forward to seeing you then.

4 Thank you.

5
6 ---Whereupon the hearing adjourned at 9:30 p.m. to
7 resume Tuesday, October 23, 1990, at 9:00 a.m.,

8 I hereby certify the foregoing to be
9 a true and accurate computerized
10 transcription of the proceedings, to
11 the best of my skill and ability.

12
13 
14 Robin M. Tokarz, C.S.R.

FEDERAL ENVIRONMENTAL
ASSESSMENT REVIEW
OFFICE

BUREAU FEDERAL
D'EXAMEN DES EVALUATIONS
ENVIRONNEMENTALES

Held at: St. Lawrence Hall
Toronto, Ontario

Date: Tuesday, October 23, 1990

Volume No.: 2

B E F O R E :

MR. BLAIR SEABORN	Chairman
MS. LOUISE ROY	Member
DR. LOIS WILSON	Member
Mr. PETER van VLIET	Member
DR. LIONEL REESE	Member
DR. LOUIS LaPIERRE	Member

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HEARING BY THE FEDERAL ENVIRONMENTAL ASSESSMENT
REVIEW OFFICE ON NUCLEAR FUEL WASTE MANAGEMENT.

SCOPING MEETING

Hearing held at the St. Lawrence Hall,
Toronto, Ontario, on Tuesday,
October 23, 1990, commencing at 9:05 a.m.

VOLUME 2

B E F O R E :

MR. BLAIR SEABORN	Chairman
MS. LOUISE ROY	Member
DR. LOIS WILSON	Member
MR. PETER van VLIET	Member
DR. LIONEL REESE	Member
DR. LOUIS LAPIERRE	Member



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A P P E A R A N C E S

E.C. CARD		Wardrop Engineering
J.M. RODGER		AMPCO, Association of Major Power Consumers in Ontario
M.A. FERADAY		Private Citizen
J. REID)	Canadian Nuclear
I. WILSON)	Association
D. LEITERMAN		Private Citizen
S. FARLINGER		Private Citizen
M. GILCHRIST		Private Citizen



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I N D E X O F P R O C E E D I N G S

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1 ---On commencing at 9:05 a.m.

2 THE CHAIRMAN: Good morning, ladies and
3 gentlemen. I would ask you to take your seats in the
4 hall, please. Welcome to this third session of the
5 scoping meetings of the environmental assessment panel
6 on nuclear fuel waste management.

7 We had full sessions yesterday afternoon
8 and evening with a goodly number of participants, and I
9 have four so far inscribed for this morning's session
10 here in Toronto, and I would like to start our
11 procedures right away if I could.

12 I would like to call as the first
13 participant, Mr. Ernie Card, who is here on behalf of
14 Wardrop Engineering Incorporated. Mr. Card.

15 PRESENTATION BY MR. CARD:

16 Thank you. I would like to begin, I
17 guess, by expressing my appreciation for the opportunity
18 to address this panel. I think that the work the panel
19 is embarking upon is of vital importance to the nuclear
20 industry, certainly, and also to Canada, and I
21 appreciate the opportunity of being able to contribute
22 our views.

23 By way of introduction, let me explain
24 that I'm here representing Wardrop Engineering which we
25 feel is in somewhat of a unique position in terms of the



1 opinions to be put forward to this panel. Wardrop has
2 worked in the nuclear industry in Canada now for many
3 years, especially in the area of waste management; and
4 as a result, we are able to offer informed and educated
5 opinions regarding the waste management concept.

6 In addition, Wardrop works in many other
7 energy alternatives and in fact nuclear power and
8 nuclear energy is really quite a small part of our
9 business, so therefore we are able to offer impartial
10 opinions and we are not dependent upon the nuclear
11 industry for our source of livelihood.

12 Based on our extensive knowledge in the
13 industry, we are convinced that nuclear is an attractive
14 energy source that has proven itself to be a safe,
15 environmentally acceptable, reliable, and economic.

16 However, like all energy sources, nuclear
17 does produce waste. Fortunately, the volume of these
18 wastes is small, making them easy to manage.
19 Nonetheless these wastes must be managed in a safe and
20 responsible manner that will not adversely affect the
21 environment now or in the future. Therefore, as I said
22 earlier, Wardrop strongly supports this environmental
23 review process that is beginning, as we see it an
24 essential part of the overall process towards the
25 responsible management of nuclear wastes.



1 We have five recommendations to put
2 forward to you today, regarding the issues which should
3 be included in the guidelines for the environmental
4 impact statement and in the subsequent hearings and
5 evaluations. I will list these briefly now and then
6 expand on each one in somewhat more detail in the
7 following part of my presentation.

8 My first recommendation is that the impact
9 statement and the subsequent evaluations and hearings
10 should be confined to an evaluation of the proposed
11 concept as compared with reasonable and practical
12 alternatives to waste management.

13 Secondly, we feel that the statement and
14 the panel should avoid getting into general discussions
15 on the relative merits of nuclear energy.

16 Third, we believe the panel should insist
17 that only factual, verifiable information be presented;
18 and this restriction should apply equally well to the
19 proponent as well as to the intervenors.

20 Fourthly, we believe the panel should
21 insist that the information which is presented is
22 presented in a proper and meaningful context.

23 And, finally, we believe that the process
24 should ensure that a thorough, accurate, and impartial
25 public information program is carried out as part of ~



1 that process.

2 Let me just expand very briefly on the
3 credentials of Wardrop Engineering, to put in context
4 the remarks which will follow. I mentioned that we
5 believe we are able to offer both informed and impartial
6 opinions on the nuclear program in general and on waste
7 management in particular.

8 Wardrop is a Canadian consulting
9 engineering company which for the past 35 years has been
10 involved in various high technology programs across
11 Canada and around the world.

12 For the past 20 years we have been
13 involved in the nuclear energy industry. Although we
14 work in many portions of the industry, we are especially
15 active in the waste management area.

16 In this area we have performed studies,
17 cost analyses, designs, and safety analyses of a wide
18 variety of waste management facilities, including waste
19 handling, storage, transportation and disposal systems.

20 Wardrop was the prime consultant on the
21 underground research laboratory in Lac du Bonnet, which,
22 as you know, was the principal research facility of the
23 Canadian Nuclear Fuel Waste Management Program.

24 Therefore, we feel we are knowledgeable about the
25 concept being proposed and we strongly support that



1 concept.

2 Wardrop also performs environmental impact
3 assessments and other types of environmental services;
4 and, in fact, we have recently established an affiliated
5 company specializing in environmental evaluations and
6 solutions. Consequently, we strongly support the
7 environmental assessment panel process now beginning as
8 an essential part of the overall process towards
9 responsible waste management.

10 However, in addition to nuclear power,
11 Wardrop also works in most other major energy
12 alternatives. These include hydroelectric, thermal,
13 solar, hydrogen, biomass, and ethanol. We also have
14 considerable expertise and are very active in the fields
15 of energy conservation, energy management.

16 Therefore, we have no vested interest in
17 the nuclear industry compared with that of other
18 alternatives and, in fact, we currently do substantially
19 more work in the hydroelectric business than we do in
20 nuclear. Therefore we feel we can offer impartial
21 opinions on the advantages and disadvantages of nuclear
22 power compared with the alternatives since we are not
23 dependent on any one energy industry for our future.

24 However, like the rest of Canada, we do
25 depend very strongly on the availability of safe,



1 environmentally acceptable, economical, and reliable
2 electrical energy, and we believe that nuclear is an
3 essential component of that overall energy supply
4 system.

5 Now, allow me to move on to our
6 recommendations. Our first recommendation is that the
7 environmental impact statement and the subsequent
8 hearings and evaluations should be confined to the
9 proposed concept for nuclear waste management; that is,
10 deep geological disposal, as compared with other viable
11 alternatives which are being considered in other
12 countries.

13 We feel the proposed concept should be
14 compared only with those other concepts which have been
15 proven viable and practical through scientific studies
16 which have been conducted in sufficient depth to prove
17 their merit. We do not believe that comparisons should
18 be made with unrealistic or impractical alternatives or
19 with ideas that have not been studied in sufficient
20 depth.

21 Much effort has been expended around the
22 world on researching waste management alternatives. As
23 a result of the research, a number of concepts have been
24 selected as being the most viable and practical. We
25 believe that it would be a waste of the panel's time as



1 well as that of the proponents' and the intervenors' to
2 dwell on other concepts which the world's scientific
3 community has rejected as being unworkable.

4 Especially, we believe, that the panel
5 should avoid the study of "pie-in-the-sky" type of
6 concepts, promising magical solutions which have not
7 been subjected to credible scientific peer review.

8 We also recommend that issues parallel to
9 the waste management process should not be addressed at
10 this time. These could include fuel reprocessing,
11 alternative fuel cycles, and fusion energy. All of
12 these are very important issues and worthy of careful
13 study, but we do not believe they are relevant to the
14 selection of the best waste management concept. Nuclear
15 wastes currently exist which need to be managed now and
16 more will be produced in the future regardless of the
17 progress in these other areas.

18 Our second recommendation is that the
19 panel, the statement, and the hearings should avoid
20 getting into a general discussion on the merits of
21 nuclear energy. As I mentioned, Wardrop Engineering
22 strongly believes in the advantages of nuclear energy.
23 This is based upon our 20 years of experience in the
24 industry and is not biased by dependence on that
25 industry.



1 Nuclear power has been demonstrated to be
2 safe, environmentally acceptable, reliable, and
3 economical. It does not contribute to acid rain or
4 global warming the way fossil fuel generating stations
5 do. It does not involve the flooding of vast areas of
6 land and the associated build-up of toxins such as
7 mercury, sometimes associated with hydroelectric
8 projects.

9 Other alternatives such as solar and wind
10 power are unable to supply sufficient quantities of the
11 cheap and reliable electrical energy which the Canadian
12 economy needs to maintain our current standard of
13 living.

14 However, the debate over nuclear energy
15 will obviously be ongoing for many years, but we do not
16 believe that is relevant to the environmental impact
17 assessment of the waste management concept. Nuclear
18 energy is a reality today and will continue to provide a
19 significant share of our energy in the future.

20 Our current generation is enjoying the
21 benefits of nuclear power through safe and efficient and
22 affordable electrical energy. We are therefore morally
23 obligated to ensure that those wastes are managed
24 responsibly; both the wastes which currently exist and
25 those which are produced in the future. The same is, of



1 course, true for all wastes, whether they come from
2 fossil-fired plants, chemical installations, or others.

3 We believe the focus of this panel should
4 be, given the need for nuclear waste management, to
5 ensure that the proposed concept is acceptable from an
6 environmental point of view.

7 Our third recommendation is that the
8 environmental impact statement, hearings, and
9 evaluations should deal only with specific and
10 verifiable facts and accepted theories that have been
11 subjected to a thorough scientific peer review process
12 by qualified experts in the relevant fields. We believe
13 the panel should reject non-specific statements,
14 unsubstantiated opinions, and innuendo. And these
15 restrictions should apply equally well to the proponent
16 as well as to the intervenors.

17 In particular we recommend the panel
18 should be wary of the opinions of so-called scientific
19 experts making judgments outside of their sphere of
20 expertise. The opinion of a scientific expert on the
21 geological stability of the Canadian Shield or the
22 long-term performance of waste management or waste
23 disposal containers may sound impressive; but if that
24 expert is a specialist in entomology or astronomy rather
25 that geology or materials science, then his or her



1 opinions must be carefully weighed.

2 The fourth recommendation is that the
3 panel should insist that all information presented be
4 put in a proper and meaningful context. From technical,
5 economic, and social perspectives, the issues of nuclear
6 waste management are very complex. They also tend to
7 elicit emotional opinions and reactions from a wide
8 range of people.

9 In their enthusiasm, people are inclined
10 to quote facts and figures out of context, often with
11 the very best intentions because most people truly do
12 believe that the opinions they are expressing are the
13 correct ones. Unfortunately, facts and opinions
14 expressed out of context can be misleading both to the
15 public and to the environmental assessment process.

16 Therefore, we believe that that process
17 must deal with facts that are put in the proper and
18 meaningful context; otherwise, data which is technically
19 correct could convey incorrect impressions or even could
20 convey the contrary to what the data actually indicates.

21 For example, the quantity of activity of
22 the radionuclide can be made to sound like a very large
23 number by using small units. A million micro-Curies
24 sounds like a much larger number than one Curie,
25 whereas, in fact, both represent exactly the same



1 quantity. More importantly, both numbers are
2 meaningless unless it is compared with the total
3 activity released from all sources, be they nuclear
4 fossil, or a host of other non-nuclear sources.

5 In the same way, to quote the amount of
6 radiation that a group of people may be exposed to from
7 waste management activities has no meaning unless it is
8 compared with the total radiation to which the general
9 public is exposed from natural background sources.

10 Likewise, to state the life of nuclear
11 wastes as being thousands of years is misleading unless
12 it is also stated that stable wastes such as arsenic and
13 mercury last forever and do not decay to innocuous
14 levels the way nuclear power does.

15 Our final recommendation is that the
16 environmental impact panel in the process should ensure
17 that a thorough public information program is carried
18 out. We believe it is of paramount importance that this
19 process be accompanied by such a public information
20 program and that that program be thorough, accurate, and
21 impartial.

22 The environmental assessment panel should
23 have the mechanism to accurately and impartially inform
24 the public or else should ensure that this is done by
25 others.



1 The complex technical, environmental,
2 economic, and social issues associated with nuclear
3 waste management must be presented to the public in
4 easily grasped and easily understood terms. This
5 information must be complete and balanced, presenting
6 both the positive and negative impacts.

7 As mentioned earlier, all information must
8 be verifiable data, subjected to review by experts, and
9 all should be presented in proper and meaningful
10 contexts.

11 Wardrop's experience on previous
12 environmental impact assessments has indicated that most
13 often attention was focused on the negative impacts
14 while little notice is given to the positive impacts,
15 even though these often can be significant.

16 For example, the construction and
17 operation of waste management facilities could bring
18 significant socio-economic impacts, positive impacts to
19 the people in surrounding communities. We believe these
20 positive impacts should be given equal attention like
21 all the others.

22 So in summary then, Wardrop feels that we
23 are well qualified to form educated and impartial
24 opinions on nuclear energy in general but on waste
25 management in particular. Based on our 20 years of



1 experience in the industry, we have formed the opinion
2 that nuclear energy is an excellent energy source and
3 that it is of vital importance to the economy of Canada
4 and the wellbeing of our citizens.

5 We support the waste management concept
6 being proposed by AECL. Like all Canadians, we also
7 believe in protecting our environment; therefore,
8 Wardrop strongly supports this environmental assessment
9 process.

10 We appreciate the opportunity of
11 presenting our views to you today and hope that they
12 will be of value to you as you formulate the guidelines
13 for the environmental impact statement. Thank you.

14 THE CHAIRMAN: Thank you, Mr. Card, for
15 that presentation. Can I ask if members of the panel
16 have any questions of clarification which they would
17 like to put to Mr. Card in the light of the statement
18 which he has just given us.

19 THE CHAIRMAN: Mr. van Vliet.

20 MR. VAN VLIET: Mr. Card, I appreciate the
21 fact that you have given us some interesting suggestions
22 as to how to conduct our business and certainly we will
23 take that into account.

24 In the end you make a statement of support
25 for the current concept; however, you have not given any



1 rationale for that statement. Do you have a rational
2 position for that, some facts, relative facts, and
3 verifiable information that supports that conclusion?

4 MR. CARD: Yes, obviously in fifteen
5 minutes it's not possible to get into the justification
6 of the overall concept. And my purpose today was not to
7 present scientific data. Suffice it to say, I guess,
8 that Wardrop in general and I in particular have been
9 involved with waste management concept for many years
10 now.

11 I have directed studies on the disposal
12 concept, the backfill and buffer concept, the selection
13 of container materials, the packing of those containers,
14 the workings of the underground disposal vault. I have
15 also shown a strong interest in the overall program and
16 tried to follow the geology and the hydrogeology as best
17 I could. My area is mechanical engineering and not
18 geology. From my own area of expertise, I am confident
19 that the work is well done, well founded, and makes a
20 lot of sense.

21 Those other areas where I am not an expert
22 such as the geology, all I can do is evaluate the
23 scientific process which is being followed, the peer
24 review which is being applied. And what the proponent
25 and the reviewers are saying is that this is a good



1 concept.

2 THE CHAIRMAN: Ms. Roy.

3 MS. ROY: In your first recommendation,
4 you say:

5 "However, comparisons should only be
6 made with other concepts that have been
7 proven viable and practical through
8 thorough scientific studies that have been
9 conducted in enough depth to adequately
10 establish their merit."

11 Could you indicate to us what are those
12 other concepts that have been proven viable and
13 practical from your point of view that could be compared
14 to the proponent's proposal.

15 MR. CARD: I guess the criteria that I
16 would apply is the degree of scientific review that has
17 taken place. The two other concepts that I am most
18 familiar with are the Swedish concept, quite similar to
19 Canada's, of deep burial in hard rock formations and the
20 various concepts being studied in the U.S. including
21 salt, burying of wastes in salt domes. So all the
22 concepts I am aware of that are withstanding peer review
23 are geologic burial.

24 The differences deal with they type of
25 medium in which the wastes are placed. And that often I



1 think it's related to the geology of the country which
2 is conducting the research. In other words, if you have
3 hard rock you would probably use that. If you have a
4 lot of salt, you might use that.

5 My point was, I guess, to try to
6 concentrate on those other programs which have been
7 thoroughly studied and which have been shown to the best
8 of the scientists' ability to have merit. To get
9 sidetracked into, you know, a comparison of this concept
10 with another one that has not been thoroughly studied
11 and not sufficiently developed, I don't think has a lot
12 of purpose and would detract from the effort of getting
13 on with the very important job I think that you're
14 working on.

15 THE CHAIRMAN: Dr. LaPierre.

16 DR. LaPIERRE: First of all I would like
17 to thank you for your presentation.

18 I have some problems with your
19 recommendation No. 5 because as a panel member I think
20 that my primary responsibility is to listen to what's
21 being said. If we have to look at your recommendation
22 and you're saying that the assessment panel should have
23 a mechanism for impartially and accurately informing the
24 public. That means we have to have a formed opinion on
25 the process before and I have difficulty with that



1 recommendation. I don't think it's part of our mandate
2 to take a position on a project that is put forth for us
3 to review.

4 MR. CARD: Actually, our recommendation
5 was (a) or (b). I said either the panel should
6 ensure -- or should have a mechanism to carry out this
7 program or should ensure that it is done by others
8 and --

9 DR. LaPIERRE: I think that may be more
10 part of the proponent to inform.

11 MR. CARD: Sure. But I guess what I'm
12 saying is that I think as part of your mandate, you
13 should satisfy yourselves that the public has been
14 properly and impartially informed.

15 Now whether you have to do it yourself or
16 whether you insist the proponent do it or whether you
17 insist that both proponent and the intervenor do it, I
18 don't know. But to me it's fundamental that the public
19 must be properly informed of these issues. Maybe you
20 are right, maybe this isn't part of your mandate. But I
21 would like to think --

22 DR. LaPIERRE: I agree with informing the
23 public but I don't agree that I think it is part of our
24 mandate as a sober panel to look at all angles and then
25 come up with a --



1 MR. CARD: Good point.

2 THE CHAIRMAN: Dr. Wilson.

3 DR. WILSON: I was glad to see in your
4 first recommendation that you say that the concept of
5 deep geological disposal must be compared with other
6 viable alternatives. And your question is to what those
7 might be. However, I would like to ask what weight you
8 give to the ethical, cultural, and social data, which
9 may be somewhat beyond the purview of pure scientists in
10 deciding this issue?

11 MR. CARD: What weight would I assign to
12 the ethical and social impacts of one concept versus the
13 other. Is that the question?

14 DR. WILSON: No, you seem to come down
15 hard on verifiable scientific facts as being the only
16 criteria and I am asking what weight you would give to
17 ethical, cultural, social data.

18 MR. CARD: I see. I guess I tend to use
19 science in a very general term there. And what I'm
20 trying to get at, I guess, is whatever alternatives are
21 evaluated, I would like them to have been assessed by
22 experts in their fields. So if the question is geology,
23 they should be assessed by geologists. If the question
24 is one of social issues, I would like to see them
25 addressed and evaluated by people recognized as experts



1 in evaluating social issues.

2 I think personally the social and ethical
3 issues are very important. I think they are important
4 both from a moral point of view; in other words, it is
5 incumbent upon us to pay very important attention, very
6 significant attention to those issues. But I think they
7 are also important from a very practical point of view
8 that unless the ethical and social, economic issues are
9 addressed, I don't think the process will succeed.

10 DR. WILSON: So you would like to have
11 that data evaluated by experts in those particular
12 fields. What place then does the public play other than
13 being informed?

14 MR. CARD: Well, I guess social issues are
15 not my specialty. I am a member of the social public, I
16 guess, so... I'm part of the process, but it's not one
17 that I've studied in great detail.

18 It seems to me that in terms of social and
19 ethical issues, one of the pieces of data must be how
20 the public feels about certain things. And to have, you
21 know, ethical specialists, if you like, sit in a room
22 and decide what and what is not ethical without
23 listening to the public's opinion of what they think is
24 ethical would not be a proper method.

25 I think if you are talking about what is



1 socially acceptable, what is ethical, the people's
2 opinion on those issues is of vital importance. If you
3 are talking about the geological stability of the
4 Canadian Shield, those people who are informed, their
5 opinion is important. The opinion of the lay person as
6 to whether or not the geological Shield is stable has
7 less value, I think, than the opinion of those people as
8 to what they consider ethical and what we should be
9 doing for future generations.

10 THE CHAIRMAN: Dr. LaPierre.

11 DR. LaPIERRE: You seem to place a great
12 emphasis on verifiable scientific data in your
13 presentation. If we look at such a project and project
14 it into the future, one has to use models to predict
15 what is going to happen in the future.

16 Now the predictability of models has been
17 shown to fail in the past. How much faith do you place
18 in the predictability of models in verifying reliable
19 scientific data?

20 MR. CARD: I guess again I wouldn't feel
21 comfortable in stepping outside of my own area of
22 expertise, which in my case, mechanical engineering,
23 doesn't involve a lot of predictions of those time
24 frames you are speaking of.

25 I think the area where the long-term



1 predictions are required is geologic stability,
2 hydrogeology, areas such as that, where I am really not
3 an expert, so I am not able to comment on the validity
4 of those models and the accuracy of their predictions.
5 But I think one has to be practical, I guess. And, as I
6 said, given the fact that we do have nuclear wastes and
7 must manage them, we have to rely I think upon the best
8 knowledge available in our country and around the world
9 to ensure we get the best solution to this management.

10 So if the best experts that we can find in
11 a given area tell us that, yes, this model is as
12 accurate as can be, is conservative, that the design of
13 the system is such to allow for inaccuracies or
14 unpredictabilities; in other words, if your models tell
15 you that the flow of groundwater at depth is 1 metre per
16 year, if you can show that in fact the vault concept
17 will withstand the flow of ten times that amount, that
18 gives one a fair bit of confidence that even if the
19 models are inaccurate, the consequences are not
20 significant. If in fact your model predicts 1 metre per
21 year but your design is based on no more than 1.5 metres
22 per year, that in my mind would be poor engineering
23 practice.

24 DR. LaPIERRE: Thank you.

25 THE CHAIRMAN: Thank you very much for the



1 presentation and for the answers to the questions we put
2 to you, Mr. Card.

3 MR. CARD: Thank you.

4 ---Mr. Card withdraws.

5 THE CHAIRMAN: Could I call next on the
6 Association of Major Power Consumers in Ontario; a
7 presentation which will be given I think by from Borden
8 & Elliot, Mr. Mark Rodger.

9 PRESENTATION BY MR. RODGER:

10 Thank you, Mr. Chairman, members of the
11 panel. My name is Mark Rodger and I am counsel to an
12 organization which is called AMPCO, the Association of
13 Major Power Consumers in Ontario.

14 I distributed this morning a written
15 submission; and while I don't intend to simply read
16 through this, I will highlight certain themes. And
17 while we are under certain time constraints, I will do a
18 review and then identify the issues that AMPCO believes
19 should be included in the environmental impact
20 statement.

21 It's important before I identify the
22 issues to say a little bit about the organization that I
23 represent because the background and the nature of the
24 organization and their views on energy sources generally
25 within the province are inextricably bound to the issue



1 of nuclear waste management, so I would like to take a
2 few minutes and describe the background and the context
3 of AMPCO's position.

4 AMPCO is an organization that represents
5 62 member companies, all of which are major
6 manufacturers, power consumers, and employers in
7 Ontario. Combined and directly and indirectly, AMPCO
8 employs 400,000 people in Ontario and it consumes 21 per
9 cent of the total electricity that is produced in this
10 province which costs AMPCO \$650-million on an annual
11 basis.

12 AMPCO is a participant at the annual rate
13 hearings before the Ontario Energy Board and will also
14 be a full-time participant at the Ontario Environmental
15 Assessment Board's review of Ontario Hydro's
16 demand/supply plan which will look at this province's
17 energy requirements for the next 25 years.

18 In terms of a context of AMPCO's position
19 and the energy supply that's required for this province,
20 AMPCO firmly advocates a very balanced approach to
21 energy needs which takes into account environmental,
22 social, and economic concerns.

23 And it's an organization that tries to
24 reject extreme suggestions such as on the one hand
25 rejecting a system which would only strive for minimum



1 costs supply or strive to rely only on conservation; and
2 on the other extreme, rejects any unduly costly systems
3 which would inevitably injure Ontario's competitiveness
4 in the national and international economy.

5 And this unduly costly system would also
6 apply to a nuclear waste disposal site, depending on how
7 the final details are worked out. That's also an issue
8 that AMPCO is concerned about.

9 Notwithstanding the recession that we are
10 currently in, AMPCO believes that over the next quarter
11 century and beyond, Ontario's economy will continue to
12 increase significantly. And that notwithstanding the
13 most strenuous efforts at conservation and private or
14 non-utility generators, that major new sources of power
15 will be required.

16 And even if one were to assume that in the
17 next decade and beyond, there will only be a minimum
18 amount of growth, there is a number of obsolete
19 generation that is currently under the realm of Ontario
20 Hydro which will need to be replaced. And by 2003 the
21 plant retirements could equal some 9,000 megawatts that
22 will have to be replaced.

23 Now as AMPCO advocates a new power supply,
24 it also is very concerned about protecting the
25 environment to the greatest extent that can be attained.



1 And for AMPCO, the preferred option is nuclear plants
2 for the base load and gas-fired plants for intermediate
3 and peak load service.

4 And AMPCO believes that the CANDU form of
5 nuclear reactor is less threatening to the environment
6 than any carbon-based fuels with their attendant
7 greenhouse effects. AMPCO strongly endorses burying
8 nuclear waste in stable rock formations and feels that
9 Canada is particularly appropriate for this exercise,
10 given its geology and numerous siting possibilities.

11 AMPCO would also support to have the first
12 disposal site sited in Ontario as this province has the
13 bulk of nuclear generation.

14 In terms of the issues for the management
15 of nuclear waste, the range of issues that we believe
16 should be included in the environmental impact statement
17 roughly fall into three categories: environmental, and
18 that's in its broadest sense; social; and economic
19 matters.

20 If I could just review the issues that I
21 have included in my submissions. The first section is:
22 What level of nuclear power development in Canada should
23 determine the need for permanent waste fuel disposal
24 facilities and has this level already been achieved?

25 Now while I appreciate that it's stated



1 that it's beyond this Board's jurisdiction to comment on
2 local or provincial areas of discussion in terms of
3 preferred modes of energy or sources of energy, I think
4 we have to recognize that with this change of government
5 in this province, that a major plank in their
6 environmental platform was to do away with nuclear
7 plants altogether. So our question is: Is this federal
8 panel premature if in Ontario there is going to be no
9 more nuclear plants and we can ascertain at least a
10 finite amount of waste that's going to be produced. We
11 don't know the answer to this but we think it should be
12 considered.

13 Should Canada strive to internationalize
14 the disposal facilities? And, for example, why must
15 every country that has nuclear power plants also have a
16 permanent disposal site if, for example, and talking
17 about recycling spent fuel, some countries such as
18 Germany and France, and I believe the U.K., are offering
19 recycling to other countries on a fee basis. Is this
20 something that should be analysed in terms of Canada
21 having kind of a permanent site.

22 As kind of a corollary to that question,
23 another issue would be if hosting a disposal site
24 becomes an attractive possibility for a community,
25 what's the possibility and what's the desirability of



1 establishing large disposal grounds that could receive
2 waste from other jurisdictions outside the country.

3 Are the safety assessment programs and
4 procedures proposed by the AECL for nuclear waste
5 disposal appropriate and are the physical monitoring
6 facilities proposed appropriate to protect the human
7 health and to the environment. And again that's in its
8 broadest sense of the word.

9 Is the program for workers' safety
10 adequate and appropriate and what particular safety
11 standards will be implemented to ensure workers' safety?
12 And we stress that the transport and burial stage, we
13 would be very interested to see what kind of standards
14 are in place for those two exercises.

15 The next issue is very broad and we
16 appreciate that but it's to date something that we
17 really haven't picked up on in the material that's been
18 distributed. Has the worst case scenario for the whole
19 disposal program been defined and if so what mitigating
20 measures have been identified?

21 Do we possess sufficient knowledge to
22 successfully anticipate groundwater movement in granite
23 rock? And as an associated issue, what contingency
24 plans are in place for the retrievable of any defective
25 storage casks found to be leaking after burial?



1 In terms of transporting the nuclear
2 waste, has the preferred mode of transport been
3 identified and what are the pertinent safety and
4 economic considerations for transport by rail, road and
5 water?

6 Has the process for the safe disposal of
7 nuclear waste been designed to preclude cascading
8 failures? And with that I mean if these wastes are to
9 be containerized, is there any possibility -- it happens
10 occasionally with other containerized wastes where
11 either during the transport stage or the burial stage,
12 you have a number of these containers stick together and
13 for whatever reason there is a puncture or somehow these
14 casks are penetrated, is there a chance of a cascading
15 or a chain reaction to other casks? And what can be
16 done to alleviate that concern.

17 And, finally, has the possibility of
18 recycling spent CANDU nuclear fuel in Canada been ruled
19 out if the recovered visible material can be sold to
20 other operators so as to relieve the cost for permanent
21 disposal?

22 I would just also like to go on the record
23 by saying that we would also like notice of any further
24 meetings and developments with respect to this
25 environmental assessment and we also would like to



1 receive any further reports or studies that the Board
2 makes available to the public.

3 Those are all my comments and I will try
4 and do my best to answer any questions that you might
5 have.

6 THE CHAIRMAN: Thank you, Mr. Rodger.

7 Any questions which panel members would
8 like to put to our participant? Dr. Wilson.

9 DR. WILSON: I am interested in your first
10 issue which sure enough is outside our mandate but still
11 you made the point that you think that we may be
12 premature in this panel. It relates to number 8: Do we
13 possess sufficient knowledge to successfully anticipate
14 groundwater movement in granite rock? The fact that
15 you've raised it means that you think that we don't.
16 What time frame would you anticipate we need until that
17 is known?

18 MR. RODGER: Our concern came there in a
19 review of the material. It just seemed to us that there
20 wasn't any definite answers and some might argue there's
21 never any definite answers in science. It certainly was
22 ambiguous and just raises an area of concern over what
23 is the level of that knowledge. And just for our
24 review, it didn't seem like there was any kind of
25 consensus on how water would move in that stable rock,



1 so it's more a question of what is the level of
2 knowledge?

3 THE CHAIRMAN: Thank you very much indeed,
4 Mr. Rodger, and we have noted your request to be kept
5 informed of any future meetings of this panel.

6 MR. RODGER: Thank you very much, Mr.
7 Chairman, and members of the panel.

8 ---Mr. Rodger withdraws.

9 THE CHAIRMAN: I would call next on Mr.
10 M.A. Feraday to make a presentation to the panel.

11 PRESENTATION BY MR. FERADAY:

12 Thank you, Mr. Chairman, for the
13 opportunity to present my views on issues which should
14 be included in the guidelines that the panel will give
15 to AECL for the preparation of the environmental impact
16 statement.

17 In addition, I would like to comment on
18 issues which should be specifically excluded from the
19 EIS, or alternatively, only included in brief summary
20 form.

21 This morning I am speaking as a private
22 citizen; I'm not an employee of any of the proponents.

23 First of all, I would like to briefly
24 outline my credentials, experience, and interest related
25 to the current project. As a professional engineer, I



1 have worked for about 35 years in the nuclear industry
2 in Canada and I have worked in most facets of the
3 nuclear fuel cycle in Canada and India and Austria.

4 From 1984 to 1989 I was a senior officer
5 with the waste management group of the International
6 Atomic Energy Agency in Vienna and had the opportunity
7 to assist developing countries to safely manage their
8 nuclear wastes.

9 During the past decade, I have taken a
10 great personal interest in the cleanup of the
11 environment, waste reduction, and the management methods
12 for all kinds of toxic wastes. Currently I am working
13 as a private consultant in areas for which I have
14 technical and managerial expertise.

15 Like the panel, I care very deeply for the
16 kind of world we are leaving to our children and this is
17 one of the reasons that I am strongly in favour of the
18 nuclear option.

19 Also, I resent wasteful expenditure of
20 funds to strive for perfection when perfection is not
21 required. Having lived for several years in developing
22 countries, I was ashamed to see thousands of children
23 dying from the lack of pure water or inoculations,
24 while we in North America spent millions of dollars in
25 striving for absolute safety in the nuclear industry.



1 Obviously the main objective of the EIS
2 guidelines is to ensure that the proponent addresses the
3 environmental, health, safety, and socio-economic issues
4 related to the safe siting, construction, operation,
5 closure, and long-term effects of the disposal concept.

6 This analysis should not only include the
7 implications related to the approval of such a facility
8 but also the regional and global issues and impacts
9 related to a long delay in the approval or rejection of
10 the selected disposal concept entirely.

11 A secondary objective should be to direct
12 the proponent to exclude detailed analysis of fill
13 issues which have little relevance to the proposed
14 facility and/or which have been covered in great detail
15 elsewhere. Such issues will only divert the attention
16 of the panel, the proponent, the public, and reviewers
17 from the the real issues and be a waste of taxpayers'
18 money.

19 To assist in assessing the items which
20 should be included in the guidelines, I found it
21 necessary to prepare a simple table of contents for the
22 EIS and that is shown in Appendix A of the presentation.
23 I do not have the temerity to suggest that this table
24 contains a depth of content required for the final
25 study; it merely provides a skeletal outline of the EIS



1 document and a conveneient structure to discuss the few
2 points I would like to make. The items that I will be
3 commenting on are shown in the first transparency.

4 I do not propose to discuss guidelines for
5 the highly technical items in the table of content. Dr.
6 Torgerson of AECL, Dr. Price of the Scientific Review
7 Group, and other speakers made a number of valuable
8 suggestions yesterday.

9 Going on then to the first item, which is
10 entitled Section 2.2, nuclear fuel waste disposal
11 options. As background for the interested lay person,
12 the EIS should contain a brief review of the generic
13 options which were initially considered for the disposal
14 of nuclear fuel waste and the reasons for rejecting all
15 but underground disposal.

16 The options include transmutation to
17 stable or short-lived radionuclides; disposal in deep
18 space; and geological disposal in continental ice
19 sheets, the sea bed, or deep underground.

20 However, a detailed analysis of each of
21 the rejected options should be specifically excluded.
22 Such detailed analyses are readily available and can be
23 referenced in EIS.

24 The major focus of the EIS should be on
25 the option which was selected for detailed study because



1 it was judged to be the best concept for Canadian
2 conditions; that is, deep underground disposal in
3 granite rock formations in the highly stable Canadian
4 Shield.

5 If at the end of the review, it is decided
6 that this concept is not defensible then other
7 alternatives would have to be considered. We should not
8 clutter up the assessment of the present concept with
9 all these other matters.

10 Looking at the next point, Section 2.3,
11 which is the status of nuclear fuel waste disposal
12 options in selected countries, the EIS should contain a
13 brief review of the status of other national/
14 international programs for the disposal of nuclear fuel
15 wastes and the technical problems being used to assess
16 the concepts.

17 This information will assist the panel and
18 the public to determine if the Canadian concept is
19 consistent with the best international designs and if
20 our analysis of the safety of the design is as rigorous
21 as those being done elsewhere.

22 The next point, Section 2.4, options being
23 used or proposed for the disposal of non-radioactive
24 toxic wastes in Canada. Each year, huge volumes of
25 non-radioactive chemical wastes are produced in Canada.



1 Many of these wastes are as toxic as or more toxic than
2 nuclear fuel and they do not decay with time. If you
3 have any gold or silver objects, drive a car, or even
4 bicycle, you are part of the problem. You created some
5 of these wastes.

6 The EIS should contain a brief review of
7 the management disposal options being used for
8 non-radioactive toxic wastes. From this information,
9 the panel and public can determine if the proponent has
10 taken into account these valuable data and if the
11 disposal concept is at least as safe as those being used
12 for equally toxic wastes. The data will also show just
13 how careful and responsible the nuclear industry has
14 been in managing the small volumes of nuclear fuel
15 waste.

16 I believe that inclusion of such
17 information in EIS would be of great interest and is
18 within the mandate of the panel for the following
19 reasons: first, the repository will contain some
20 chemically toxic elements such as antimony, lead and
21 cadmium from the fuel and/or from the matrix of
22 lead-antimony alloy if that is used to mobilize the fuel
23 bundles; and, second, scientifically correct information
24 from any source should be considered as legitimate input
25 to assess the viability and safety of an endeavour being



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1 proposed by the proponent.

2 The next item is Section 2.9, previous
3 reviews of the project. The EIS should contain a
4 summary of major independent provincial, national,
5 and/or international input and reviews which were done
6 during the development of the proposed disposal concept.

7 The summary should include such things as
8 a description of the input, conclusions or
9 recommendations of the review, credentials of the
10 reviewer, how the reviewers were selected, et cetera.
11 This information will assist the panel and other
12 interested parties to judge the competence of those who
13 did the reviews and determine if the project was
14 developed in isolation or under ongoing critical
15 scrutiny.

16 The last specific point I would like to
17 make is dealing with Section 6.0, the environmental,
18 social, and economical impacts of (a) long delays in
19 approval of the project; and (b) rejection of the
20 proposed concept.

21 In addition to addressing the impact of
22 issues related to the siting, construction, operation,
23 closure, and long-term effects of the facility, the EIS
24 should also clearly outline the regional global impacts
25 related to long delays in the approval of the facility



1 or rejection of the disposal concept entirely.

2 It is assumed that eventually some type of
3 disposal facility will be approved for nuclear fuels,
4 since there are no other long-term solutions.

5 Perpetual storage of used nuclear fuel
6 waste or any other kind of long lived chemical toxic
7 waste is not a defensible or acceptable management
8 method on technical and moral grounds, so some form of
9 disposal is required. It may be possible to guarantee
10 safety of storage facilities through institutional
11 control for 100, 500 or possibly even a thousand years.
12 But for tens and hundreds of thousands of years, no way.

13 In the past, delays in the building
14 start-up and operation of nuclear facilities have arisen
15 from two basic reasons: first, to make legitimate
16 cost-effective improvements to the facility to ensure
17 that the safety of the environment and humans is
18 protected in a suitable manner. Suggestions for
19 improvements have arisen from FEARO-type panels,
20 regulatory authorities, international agencies, such as
21 the IAEA, from industry and from responsible
22 intervenors.

23 And the second reason for delay is in
24 response to deliberate scare tactics by anti-nuclear
25 groups; some of which either do not know the facts or do



1 not wish to be concerned with them. These tactics
2 resulted in unwarranted expenditures of tens of million
3 of dollars per life saved per year. Let us hope that
4 such frivolous use of public funds will never occur
5 again.

6 As Dr. Jim McGaw, (phoen.) chairman of the
7 department of physics at York University points out in
8 his recent book, many of the so-called environmental
9 organizations have largely become private self-interest
10 groups like the proponent.

11 Their funding and salaries have become
12 increasingly dependent on their success in coming up
13 with issues to gain media coverage and give the
14 impression they are protecting the public against the
15 evils of nuclear energy. Like the boy who cried wolf
16 once too often, it is not only the U.S. Department of
17 Energy which has a problem with their acceptability.

18 Therefore it is very important that the
19 proponent clearly identify potential impacts which could
20 result from delays in approval of the proposed facility
21 and from the complete rejection of the concept of
22 disposal deep in the Canadian Shield. This type of
23 analysis will be of particular value to the panel when
24 they are assessing the EIS to determine if further work
25 which could result in significant delays in the start of



1 construction is warranted.

2 Obviously, decisions to change the
3 proposed design and delay the project significantly
4 should be based on a cost/benefit or multi-attribute
5 analysis which assesses the benefits which will arise to
6 society from such a delay against the net cost of the
7 delay. For example, if the cost to cover resources and
8 delay to improve the design or operation of the proposed
9 facility to save a few lives per year is \$50-million,
10 the resources could be spent far more effectively to
11 save thousands of lives elsewhere; for example, in our
12 native communities, for the needy, or in cleaning up the
13 real problems in the environment.

14 Although it is unlikely that any of the
15 other concepts considered during the first stages of the
16 study could displace geologic disposal as the preferred
17 option, the proponent should briefly outline what the
18 implications of such a change would be.

19 Looking now at some general guidelines
20 which might make it easier for the panel and the public
21 to understand the technical scientific information in
22 the EIS and the potential impacts on society in the
23 environment. Firstly, the main text of the EIS should
24 be written in plain descriptive language suitable for
25 the educated lay person with complex technical details



1 in appendices or referenced.

2 Secondly, we have a good understanding of
3 the impacts of nuclear hazards, the means to control
4 them and the migration mechanisms for radionuclides in
5 the geosphere. In the EIS, the proponent should clearly
6 outline the expected detriment to the environment and
7 humans arising from the expected releases from various
8 repository designs.

9 This information will assist the panel and
10 the reviewers to determine if, first, the proposed
11 design is consistent with regulatory criteria; and
12 secondly, is the facility over-designed, that is, is a
13 Rolls Royce version of the facility being proposed when
14 a Pontiac version will do just as well? All we are
15 spending on any facility can have a detrimental
16 environmental effect since this would take away
17 resources from other serious problems.

18 Finally, and most importantly, the
19 guidelines must be based on common sense. In the past,
20 certain regulatory guidelines have lead to overly
21 restrictive conditions on proponents of various
22 facilities. This is particularly true in the nuclear
23 industry. As an example, this figure shows the final
24 evolution of a cowboy after compliance with regulatory
25 guidelines on safety and emission controls.



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1 I realize that an environmental review is
2 not a laughing matter. However, we must not get so
3 wrapped up in the individual trees that we lose sight of
4 the whole forest. True environmental assessment must
5 consider global impacts, not just our own immediate
6 narrow national interests.

7 I would like to make a few points that the
8 panel might wish to consider to keep things in a proper
9 perspective. First, each year 60 million tons of coal
10 ash are accumulated in the U.S. from the generation of
11 electricity. This material contains about 4 pico-Curies
12 per gram of radium 226. A radionuclide which, along
13 with plutonium, is in the highest radiotoxicity
14 classification of the ICRP. This material is stored on
15 the surface.

16 Secondly, the one thousand excess cancer
17 deaths which might result from the fuel repository over
18 a long period which was mentioned yesterday seems
19 excessive until you realize that each year since 1960
20 about 200 deaths have occurred in the U.S. from
21 accidents from the generation of electricity with coal,
22 and this does not include the deaths from other sources
23 when actually generation emissions are taken into
24 consideration. Deaths from this cause in developing
25 countries are likely to be three or four times that



1 level.

2 The third point is that during the current
3 20-year plan, china plans to increase electricity
4 production using coal. Production will increase from
5 450- to 1200-million tons per year and eventually to
6 3-billion tons per year. Since it is unlikely that
7 China can reduce demand by conservation, let us all pray
8 that we can convince them to convert to safe nuclear
9 plants. If not, the deliberation of this panel might be
10 academic: There won't be anybody around to worry about
11 small releases from nuclear disposal facilities if the
12 greenhouse effect is real.

13 And, lastly, after three or four hundred
14 years, the geotoxicity hazard index of waste in a
15 nuclear repository will probably be less than that for
16 many uranium ore bodies, and it's approaching that of
17 the gypsum waste arising from the phosphate industry.
18 This gypsum contains about 40 pico-Curies per gram of
19 radium 226 and is accumulating at the rate of millions
20 of cubic metres per year in surplus piles.

21 Finally, during the review of the
22 information in the EIS, I hope that the criteria for
23 acceptance or rejection of the input from professional
24 intervenors will be as rigorous as they are for input
25 from the proponents.



1 In a FEARO-type forum, all groups, not
2 just the proponent, must be held accountable for the
3 pronouncements no matter how false. It is immoral for
4 independent interviewers to have power without
5 responsibility. And I would recommend to the panel that
6 reading some of the articles written by Dr. B.L. Cohen
7 of the university in Pittsburg, who I think properly and
8 clearly puts the nuclear waste problem in perspective.

9 I would like to thank you for your
10 attention and I would be pleased to answer any questions
11 that the panel might have.

12 THE CHAIRMAN: Thank you, Mr. Feraday for
13 appearing before us this morning.

14 I ask if there are any questions
15 immediately on the basis of the written and the oral
16 presentation by Mr. Feraday. Dr. LaPierre.

17 DR. LAPIERRE: Just one short question.

18 In the document that you distributed to
19 us, you don't have the reference to the coal nuclides.
20 Is it possible to get that?

21 MR. FERADAY: Yes, I can provide the panel
22 with some selective references I think would be very
23 valuable to you if that is of interest to you.

24 DR. LAPIERRE: I would appreciate that.

25 THE CHAIRMAN: We will of course have that



1 on the transcripts. There will be a full transcript.
2 But if you had it in readily available form for the
3 members of the panel now, that would be helpful, I
4 think, Mr. Feraday.

5 MR. FERADAY: I have them but I don't have
6 them here. I'm sorry.

7 THE CHAIRMAN: If you could send them to
8 the Secretariat then.

9 MR. FERADAY: I will do that, yes.

10 THE CHAIRMAN: Thank you.

11 Ms. Roy.

12 MS. ROY: You say on page 4 of your
13 document:

14 "Obviously, decisions to change the
15 proposed design and delay the project
16 significantly should be based on a
17 cost/benefit or multi-attribute analyses
18 which assesses the benefits which will
19 arise to society from such a delay against
20 the net cost of the delay."

21 I was wondering if from your point of view
22 it is possible to include in a cost/benefit analysis or
23 give a value to the risk of contaminating natural
24 resources, is this possible to introduce this kind of
25 concern in a cost/benefit analysis or do you -- is the



1 sentences that we can read in your paper already implies
2 that you considered those possible impacts of managing
3 the waste with the deep burial concept?

4 MR. FERADAY: Well, I believe - and I have
5 not been working with AECL for some five or six years -
6 but I believe that AECL does take into consideration
7 cost/benefit analysis in the design of the facility as
8 any proper engineering or scientific design should do.

9 When I'm talking about cost here, I'm
10 talking about the total cost, not just the dollar cost.
11 I am talking about the environmental cost, all the other
12 associated costs with it.

13 And when I am talking about the benefits,
14 there are positive and net benefits and these should
15 obviously be taken into consideration. And I think
16 that's really the only way you can get a true picture on
17 whether the dollar you are spending is really of benefit
18 to society or whether it is a detriment to society
19 because it is impinging on money which would be
20 available for other very important environmental
21 problems.

22 MS. ROY: Thank you.

23 THE CHAIRMAN: Mr. Van Vliet.

24 MR. VAN VLIET: Mr. Feraday, is it your
25 opinion that there are delays that are unwarranted in



1 this process?

2 MR. FERADAY: Mr. Chairman, I can't
3 certainly speak for what will happen in the future. I
4 think the proponent and the government and the various
5 panels that have reviewed -- the independent panels
6 which have reviewed the work so far have been very
7 judicious in their review of the process, and I don't
8 really think it's -- we don't want to jump into these
9 things very quickly; we want to make sure that they are
10 done properly as far as reasonably possible.

11 Looking at past environmental assessment
12 reviews, I'm not trying to point the finger at anybody
13 in particular, but in general they tend to be a little
14 on the long side. I think, though, we want to take into
15 consideration very carefully all of the facts to make
16 sure that - I'm sure the panel will - to make sure that
17 the answer we get is correct, as humanly possible,
18 taking into effect all of the conditions including the
19 moral aspects of using various energy sources.

20 So I hope there will not be very long
21 delays but I think each time there is a long delay we
22 are impinging on the safety of the environment because,
23 first of all, countries like China and other developing
24 countries will look at Canada and say, 'Gee, they don't
25 really know how to dispose of their wastes, so we better



1 go with coal-fired stations or some other', which has, I
2 think, very disastrous, potential disastrous
3 environmental impacts.

4 So, I think certainly we should not -- the
5 panel should obviously not delay any longer than it has
6 to or should the proponent. We should try and come up
7 with a pragmatic solution that is environmentally sound
8 as based on what we know. By delaying things and
9 pushing off and pushing off, it has two effects, I
10 think.

11 First of all, the anti-nuclear proponents
12 say, 'Well, let's not rush into this.' But in ten years
13 time, they say, 'Look, you guys have been doing this for
14 20 years and you still don't know the answer.' So it is
15 a very circuitous argument. This is the kind of thing
16 that has happened in the U.S. on the nuclear reactors.

17 The intervenors delayed nuclear facilities
18 with their power reactors, sometimes on good
19 justification, but they delayed them for excess periods:
20 10, 12, 14 years before a reactor would get operational
21 when it should be 4, 5, or 6 years.

22 And then they use the argument, 'Well,
23 look, nuclear is not an economic means of generating
24 power.' Well, certainly it's not if you are going to
25 delay it so long that just the cost of the funding



1 prices it out of existence.

2 Does that answer your question or maybe...

3 THE CHAIRMAN: Dr. LaPierre.

4 DR. LaPIERRE: On page 4 of your document,
5 in the middle of the page, you refer to the tactics
6 resulting in unwarranted expenditures of tens of
7 millions of dollars per life saved. I wonder if you
8 have a figure where you cut out the millions of dollars
9 per life saved, what is to you a reasonable expenditure
10 if tens of millions isn't?

11 MR. FERADAY: Well, it's a hard thing to
12 say. I am not an expert on that. I think in the
13 nuclear industry, I think they use \$10,000 -- I am not
14 sure. No, I'm not an expert on that. But certainly
15 when you are talking about multi-million dollars per
16 life saved, I think the money could be far better spent
17 in assisting developing countries or even our own
18 indigenous people or our poor people.

19 DR. LaPIERRE: But you don't have a bottom
20 line as to where you --

21 MR. FERADAY: I'm sorry I don't, no. But
22 there are people that have the bottom line far better
23 than I have.

24 THE CHAIRMAN: Dr. Wilson.

25 DR. WILSON: Just on that same line.



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1 Having been active in the peace movement, you know, one
2 of the facetious arguments there was that if we just
3 disarm we could give all the money to help developing
4 countries. Would you have any assurance that in fact
5 this might happen? It didn't before.

6 MR. FERADAY: And I suspect it might not
7 now. But I think that the detriment of some of the
8 power generation sources we are using is so clear that I
9 think the answer is very clear. I don't say that
10 nuclear is the only solution. There are many other good
11 solutions around. But I think it is a very safe,
12 economic solution if it's done properly. And certainly
13 Chernobyl was not done properly.

14 But even Chernobyl only resulted in 50 or
15 60 immediate deaths; there may be another 5- or 10,000
16 over the long-term and that's very unfortunate. It's a
17 disaster. And it is an economic disaster as well.

18 But when you consider that each year in
19 Europe a half a million people die from smoking-related
20 diseases, I think we -- the only point I'm trying to
21 make is we have to keep things in perspective is the
22 point I'm trying to make.

23 THE CHAIRMAN: Thank you very much indeed,
24 Mr. Feraday, for a presentation which concentrates on
25 what should be in the guidelines.



1 ---Mr. Feraday withdraws.

2 THE CHAIRMAN: We are going to allow
3 ten-minutes now and I will make it literally ten minutes
4 for a coffee break, if anyone would like to take that,
5 and we will come back ten minutes from now to resume our
6 discussions.

7 ---Recess at 10:15 a.m.

8 ---On resuming at 10:30 a.m.

9 THE CHAIRMAN: I would like to resume the
10 session now. I am fully aware of the great advantage of
11 the bits of business which get done in coffee breaks and
12 they should be encouraged. But as there has been some
13 discussion of credibility of people, I want the
14 credibility of the Chairman maintained: When he says
15 it's a ten-minute coffee break, I would like it not to
16 go beyond about fifteen, otherwise you won't believe me
17 on anything. (Laughter).

18 So if we could resume seats and hear next
19 from Mr. John Reid who will be speaking on behalf of the
20 Canadian Nuclear Association.

21 PRESENTATION BY MR. REID:

22 Mr. Chairman and members of the panel, I
23 am accompanied today with our vice-president, Mr. Ian
24 Wilson, to my left.

25 First I would like to talk about the



1 Canadian Nuclear Association which is a voluntary
2 membership organization which represents the nuclear
3 industry in discussions with government and the public
4 on matters of interest and concern to the industry.

5 The association provides a forum where
6 representatives of the industry, governments, and the
7 public can come together to discuss matters of mutual
8 interest and opportunity. It also maintain close links
9 with similar organizations in the United States, Europe,
10 and Asia.

11 Our membership includes manufacturers,
12 electric utilities, consulting engineers, construction
13 companies, banks, insurance companies, transport
14 companies, non-profit organizations such as educational
15 institutions, research laboratories, labour unions, and
16 departments of federal and provincial governments.

17 CNA member represent a broad spectrum of
18 companies involved in Canada's energy sector. Nuclear
19 electric power generation, uranium mining, and
20 applications of radiation technology are but a part of
21 their overall business interest and invovlement in the
22 Canadaian economy.

23 Many of these companies are also involved
24 in the design and construction of hydraulic or
25 coal-fired electric generating stations. They also



1 represent a very large part of Canada's industrial base
2 with interest in the security of supply of energy
3 sources for the production of goods, including
4 energy-efficient products, and in maintaining and
5 expanding employment and investment in these Canadian
6 facilities.

7 Approximately a hundred thousand Canadians
8 are employed directly or indirectly in the nuclear
9 industry. Collectively they generate more than
10 \$4-billion of nuclear-related business within the
11 Canadian economy on an annual basis.

12 This submission provides the position of
13 the CNA with respect to the scope of the review of the
14 nuclear fuel deep disposal concept.

15 In conformity with government policy and
16 direction, research and development of the proposed
17 disposal concept has been focussed on the viability of
18 disposing of high level nuclear waste deep in plutonic
19 rock in the Canadian Shield.

20 It is the view of the CNA that the main
21 question before the panel is whether or not the concept
22 proposed by AECL is acceptable; that is, can an
23 acceptable set of safety and environmental criteria be
24 met and what should those criteria be?

25 It is clear from the terms of reference



1 that the panel is expected to become fully aware of the
2 programs of other countries, particularly those
3 considering geological media. It is equally apparent
4 that the purpose of developing such awareness is to
5 allow the panel to make recommendations on studies of
6 future alternatives should the concept proposed by AECL
7 be found to be unacceptable. It is not for the purpose
8 of identifying a more acceptable concept.

9 The panel is required to examine the
10 general criteria for the long-term management of nuclear
11 fuel wastes using current storage methods and to compare
12 these with the criteria applied to the management of
13 wastes from other energy and industrial sources.

14 Although the panel may conclude from its
15 review that there are significant advantages to a
16 strategy of continuing to employ existing storage
17 methods, which have been found during decades of
18 experience to be safe and environmentally sound, this
19 again does not imply that the proposed disposal concept
20 be rejected because a more economical alternative is
21 available.

22 It is the firmly held view of the Canadian
23 Nuclear Association that in addressing the main
24 question, the acceptability of the proposed disposal
25 concept, the panel should judge the concept on its own



1 merits. Again, should the panel reject the concept, the
2 CNA believes it is incumbent on the panel to provide
3 recommendations with respect to long-term management of
4 the fuel and to indicate the criteria by which the
5 safety and environmental acceptability of such
6 management should be judged.

7 Assuming the concept is found to be
8 acceptable, the panel is then also charged with
9 providing recommendations on the process which should be
10 followed in selecting a site, the methodology required
11 to characterize sites, and the costs and benefits to
12 potential host communities.

13 Specifically not mentioned in the terms of
14 reference are the institutional arrangements which would
15 be necessary during both the siting process and the
16 process leading to the operation of a disposal facility.
17 The CNA believes it would be important for the panel to
18 review such institutional arrangements and to provide
19 recommendations with respect to these considerations.

20 Rising public concern regarding the
21 environmental impacts of other conventional methods of
22 electrical generation; namely, hydraulic power and the
23 burning of fossil fuels, emphasizes the urgent need to
24 provide public assurance that nuclear fuel is being and
25 can continue to be safely managed.



1 By precluding these and other energy
2 policy related issues from the terms of reference, the
3 government has clearly called for a review specifically
4 focussed on the question of the acceptability of the
5 disposal concept proposed by AECL.

6 The Canadian Nuclear Association therefore
7 urges the panel to limit the scope of the review
8 strictly to those matters which are directly relevant to
9 consideration of the acceptability of the proposed
10 disposal concept in meeting clearly defined safety and
11 environmental criteria.

12 Mr. Chairman, that concludes our
13 submission. We would be delighted to take questions.

14 THE CHAIRMAN: Thank you, Mr. Reid.

15 Any questions from the panel members to
16 this brief presentation by the Canadian Nuclear
17 Association?

18 Mr. Van Vliet.

19 MR. VAN VLIET: Mr. Reid, is there any
20 rationale that you can provide to back up your
21 recommendations as to the point that you make in your
22 paper that the panel should judge the concept on its own
23 merits rather than looking at other options?

24 MR. REID: Well, we specifically note,
25 sir, that you are obliged by the terms of reference to



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1 look at what other countries are doing in terms of
2 disposal concepts. And what we would like to see happen
3 is that you look at those concepts. But the focus has
4 to be on whether or not this particular proposal is
5 acceptable or not. And if not acceptable, then we
6 believe there is an obligation by the panel to come
7 forth and to outline in detail what would be the
8 criteria that a disposal concept would have to meet.

9 So that is our concern. And our concern
10 is that whatever the results of this discussion of your
11 hearings, that coming out of it is either an acceptance,
12 rejection, a modification, but at least clear and
13 precise guidelines as to what are the conditions that
14 any other form of disposal would have to meet.

15 MR. VAN VLIET: Issuing a final statement
16 that perhaps may evolve a modification, is that not
17 identifying a more acceptable concept, in principle?

18 MR. REID: In principle I suppose it's
19 possible.

20 MR. VAN VLIET: And you indicate in your
21 paper on page 3 that it is not the purpose of
22 identifying the more acceptable concept.

23 MR. REID: It's to find out whether or not
24 this particular concept meets all of the requirements.
25 It is whether or not this concept has been



1 scientifically examined, whether it meets the standards
2 of what science we have today, and whether it can do the
3 job.

4 To go beyond that, to say that there is
5 something out there, a magic wand as somebody else has
6 referred to, is I think to go somewhat beyond. But if,
7 for example, I would say that you could find a disposal
8 concept that had been developed in another country, that
9 looked to be superior to what we have, then I would
10 think that you would have to report that. And you would
11 probably have to report in terms of the AECL proposition
12 how it met or exceeded, or how it did not meet or
13 exceed, the proposal that you had found highly
14 acceptable and whether or not in fact it could be
15 upgraded to meet those requirements.

16 MR. VAN VLIET: I'm trying to find the
17 rationale for the logic behind your statements.

18 MR. REID: My logic is I don't want you
19 running off after a wild goose. What I want you to do
20 is concentrate on the proposal that is in front of you.
21 We think that using the technique of looking at other
22 proposals in other countries and other work that has
23 been done will give you a number of excellent benchmarks
24 by which to judge the proposal. And if the proposal
25 should be found wanting, so be it. If the proposal



1 should be found wanting against standards that you come
2 up with, then that is another question that has to be
3 addressed.

4 THE CHAIRMAN: You are looking ahead, of
5 course, particularly, Mr. Reid, to a final report of
6 this panel which is some distance away. At the moment
7 our concentration, of course, is on establishing,
8 identifying the issues which we will require AECL to
9 include in its guidelines. But of course the two are
10 interrelated. Our best judgment as to what are the
11 possibles or possible alternatives will have some
12 influence in what we put into our guidelines.

13 Dr. LaPierre.

14 DR. LAPIERRE: On page 3 of your report,
15 the paragraph in the middle of the page, you indicate
16 that the concepts should not be rejected because a more
17 economical alternative is available. But if the panel
18 views that the proposed and the methods presently used
19 are acceptable and the answer comes down to a economical
20 decision, does that mean that the decision should not be
21 based on economics?

22 MR. REID: I think the role of the panel
23 is to determine whether or not the AECL proposal meets
24 the criteria that you decide to set out and accept or
25 reject the scientific advice that comes along with the



1 AECL proposal.

2 If you decide that in fact it does and
3 that there is an easier or less expensive way of doing
4 it, then I think that would be appropriate for you to
5 address. But we really want your focus to be on the
6 AECL proposal because what we are afraid of is that if
7 you are not concentrating, if you do not concentrate on
8 the AECL proposal, then you won't have any focus on
9 which to base any kind of decisions.

10 It may well be that you could find a
11 proposal coming out of another country that was more
12 economical. It may well not be. But we think that the
13 important thing is to get a good grip on the proposal
14 that AECL has presented.

15 THE CHAIRMAN: Dr. Wilson.

16 DR. WILSON: Just a clarification on page
17 4, where you mention assuming the concept was found to
18 be acceptable, the panel is then charged with a number
19 of things and you mentioned the cost and benefits to
20 potential host communities. I would assume you would
21 also include the cost and benefits to the nuclear
22 industry?

23 MR. REID: Well, I think the important
24 thing is that any cost/benefit scenario for the host
25 community is very, very important because obviously we



1 will want to have a site in a host community that would
2 like to have that site and therefore there has to be a
3 very clear set of cost benefits available for them.

4 From the point of view of the nuclear
5 industry, we would want to have a disposal site that is
6 environmentally sound, first; and then, secondly, we
7 would want to look at the costs and benefits.

8 But I think our criteria is that the
9 wastes which we do produce in the industry, we want to
10 make sure that they are put away in the most
11 environmentally effective way possible. That for us is
12 the number one aspect of the cost and benefit ratios for
13 the industry itself.

14 DR. WILSON: But you would include that
15 then?

16 MR. REID: Yes, that is a thing that we
17 take as a given within the industry because the
18 industry --

19 DR. WILSON: Because it just isn't
20 mentioned here, that's all. Thank you.

21 MR. REID: Yes. Well, we were thinking
22 more in terms of the problems that have occurred when
23 decisions have been made to impose waste locations, in
24 terms of communities that are not willing to receive
25 them, and our concern is to make sure that any site that



1 is sited or chosen, that an enormous amount of work goes
2 into ensuring that those communities are happy with the
3 decision.

4 THE CHAIRMAN: No further questions from
5 the panel. Thank you very much indeed, Mr. Reid, and
6 your colleague.

7 ---Messrs. Reid and Wilson withdraw.

8 THE CHAIRMAN: Our final listed
9 participant for the morning is Mr. Doug Leiterman
10 (phoen.) who will now take the floor for us, please.

11 PRESENTATION BY MR. LEITERMAN:

12 Mr. Seaborn, members of the Federal
13 Environmental Assessment panel, I want to thank you for
14 allowing me to speak today and to address a panel whose
15 membership I have noted comes from a very broad spectrum
16 and is of a very distinguished calibre. And I would ask
17 you and the panel to bear with me on what may seem to be
18 a rather unorthodox approach to the subject in hand.

19 I come to you with no scientific
20 credentials. My only reason for being here is that I
21 have, like everyone in this country, a deep interest in
22 the subject matter. I have spent more than 40 years in
23 the examination and dissemination of matters of public
24 affairs, mainly in television, print, and to some extent
25 in motion pictures. And I have a further reason or



1 qualification, Mr. Chairman, in that I am the father of
2 five daughters capable of bearing children.

3 What I propose to do is to challenge the
4 terms of reference of the panel, which seem to me to be
5 unnecessarily restrictive and narrow, and to ask you to
6 consider recommending to the Minister that your terms of
7 reference be broadened; that they be broadened to
8 consider not merely the relative safety of the AECL's
9 plan for disposal of nuclear wastes but to consider also
10 the evidence that fission products can never be safely
11 disposed of, not in a thousand feet of Canadian Shield
12 rock, or in a thousand years.

13 I would like to ask you to consider that
14 your terms of reference be broadened to permit you to
15 consider arguments that nuclear fission and its waste
16 products are fundamentally and profoundly dangerous to
17 our environment, to the chain of human and animal life
18 as we know it. And that one of your recommendations
19 should be for Canada to phase out of the manufacture,
20 use, and export of nuclear power reactors sometime
21 before the end of the first decade of the next century.

22 What I propose to argue here, Mr. Seaborn,
23 is that your basic terms of reference are not only too
24 restrictive but they are also based on a wholly
25 unfactual assumption: the assumption that nuclear waste



1 can be safely disposed of.

2 I have heard some of the distinguished
3 speakers before your panel and I note that without
4 exception those who represent the nuclear industry or
5 who are convinced that nuclear power is the best way to
6 go or who find such a great satisfaction in the danger
7 to the environment posed by other forms of energy, that
8 all of these speakers make this assumption that nuclear
9 waste can be safely disposed of.

10 Not being a scientist, I would urge you to
11 consider the course of action that I am proposing
12 because I think every member of this panel knows that
13 there are a hundred or more highly qualified physicists
14 in this country and elsewhere who owe no dues to the
15 nuclear industry and who can and will testify that the
16 only safe way to dispose of nuclear waste is to stop
17 manufacturing them.

18 I believe it is a disservice to the public
19 for this panel to take the leap of faith or suspension
20 of disbelief necessary to support the proposition that
21 it should examine only the AECL's plan and rule out of
22 discussion the question of whether in fact the Emperor
23 has no clothes, whether nuclear power is so
24 fundamentally unsafe that Canada should get out of the
25 nuclear business and certainly get out of the business



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1 of exporting nuclear reactors to other countries, where
2 they can be used, as was the CANDU reactor we sold to
3 India, to make atomic bombs.

4 I wish to formally challenge the specific
5 terms of reference of the panel -- the specific term of
6 reference of the panel which states that this review
7 should not address, and I quote, "the construction,
8 operation, and safety of new and existing nuclear power
9 plants" and "military applications of nuclear
10 technology." These issues, it is stated, are outside
11 the panel's mandate.

12 Mr. Seaborn, I want to challenge the
13 legitimacy of that particular restriction and I want to
14 ask the panel to consider going back to the Minister and
15 asking that that particular restrictive paragraph be
16 withdrawn from the terms of reference and that the terms
17 of reference be broadened so that you can examine not
18 only how to get rid of the frightening tonnage of wastes
19 already accumulated by the nuclear industry, but so that
20 you can also recommend, if your deliberations so commend
21 to you, that Canada get out of the nuclear business with
22 all reasonable haste.

23 I want to say here that I believe --
24 excuse me, I want to say that I belong to the generation
25 which once looked with pride on the pioneering design of



1 the CANDU reactor. I was in the audience at Chalk River
2 in the fifties when the late C.D. Howe opened a new
3 phase of our nuclear capacity, but I lost my enthusiasm
4 somewhere along the line when the plutonium produced by
5 one of our reactors was the very nuclear fuel which
6 allowed India to threaten the incineration of its
7 neighbour.

8 My enthusiasm was further diminished when
9 I learned that Lloyds of London who offer for my company
10 to undertake such astonishing risks as insuring the
11 completion of movies, Mr. Chairman, will not insure the
12 safety of nuclear reactors anywhere. No, not even the
13 CANDU.

14 And I further lost enthusiasm when I
15 learned that all of Canada's nuclear reactors and those
16 of every country worldwide would have to shut down
17 tomorrow if we, the taxpayers, would no longer bear the
18 insurance risk.

19 If the CANDU reactor is so safe, Mr.
20 Chairman, as has been suggested to you, why does Lloyds
21 refuse to insure it or any other reactor. Why is it
22 that every insurance policy issued by Lloyd says in the
23 fine print that damage caused by nuclear radiation is
24 excluded from any claim.

25 Mr. Chairman, panel members, I entreat you



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1 to ask for a broadening of your terms of reference so
2 that you can examine not only the quality of the
3 Emperor's clothes but whether he is wearing any clothes
4 at all.

5 I have two footnotes I would like to
6 briefly add. One is a comment in the November issue of
7 The Atlantic Magazine in which the writer discusses the
8 feasibility of containing an oil spill. The article is
9 hauntingly analagous to the question you are facing here
10 regarding the feasibility of safely containing nuclear
11 wastes.

12 The writer is discussing the experiment
13 off the coast of Newfoundland to try out all of the
14 latest technology for containing a spill, an oil spill.
15 Here is a brief excerpt from what the writer says, and I
16 quote:

17 "The literature on the experiment leads
18 a reader to the unavoidable conclusion
19 that even under reasonably favourable
20 conditions with state-of-the- art
21 equipment, state-of-the-art chemicals,
22 sufficient trained personnel, well
23 co-ordinated organizations, and a
24 completely predictable time of spill, the
25 recovery, the effective oil recovery is by



1 any reasonable definition simply
2 impossible."

3 I would commend this article to you and
4 also the thought that the safe disposal of nuclear
5 wastes, too, made by any reasonable definition be simply
6 impossible.

7 My second footnote is from an article by
8 an American reporter who recently visited Chernobyl and
9 it was published in the July 24, 1990, edition of the
10 Christian Science Monitor. On June 21st of this year,
11 the Russians announced that they were setting up an
12 international centre at Chernobyl to study the
13 radiological consequences of a nuclear reactor
14 breakdown.

15 Mr. Chairman, I believe this panel should
16 visit Chernobyl. You are studying the entombing in the
17 Canadian Shield of nuclear fission products. The
18 Russians have already built such a tomb, the world's
19 largest, enclosing radioactive plutonium. It will take
20 24,000 years for the plutonium to lose half of its
21 radioactivity and another 24,000 years to reduce it by
22 half again.

23 Byelorussia has lost one fifth of its
24 arable land, the report says, and 15 per cent of its
25 forests:



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1 "There are no fish in the rivers.
2 Mushrooms, wild fruit, and berries are
3 highly contaminated. Tens of thousands of
4 farm animals had to be destroyed...
5 50,000 Ukrainians are undergoing full-time
6 monitoring for health problems; another
7 900,000 would be included if resources
8 could be found."

9 Of course, Mr. Chairman, we are all aware
10 that the Chernobyl reactor was not a CANDU and that our
11 reactors in spite of the faulty tubes made by Babcock
12 and Wilcox are safer perhaps than most. But surely this
13 panel should include discussion on the patent insanity
14 in my view of building more reactors near population
15 centres, on the fact that Ontario Hydro, for example, is
16 going full steam ahead, subject to the imperatives of
17 the new Ontario government, to build more reactors when
18 not a single new reactor has been constructed in the
19 United States since Three Mile Island. And many other
20 countries have placed a moratorium on nuclear power
21 construction.

22 Mr. Seaborn, panel members, I am not here
23 as a member of an anti-nuclear group. I am not seeking
24 any personal notoriety. I have no axe to grind. I am
25 an ordinary Canadian who is enraged by the soft-sell



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1 public relations campaign of the nuclear industry,
2 indignant at the restrictive terms of reference of this
3 enquiry, and who hopes you will include a recommendation
4 to phase out nuclear power and reduce the risks that the
5 generations yet unborn will suffer from this curse.

6 You are charged with considering the
7 degree to which we should relieve future generations of
8 the burden of looking after nuclear wastes. Please do
9 not ignore in your deliberations that the best way to
10 relieve future generations may be to eliminate the
11 cause. Thank you.

12 THE CHAIRMAN: Does the panel have any
13 questions to put to Mr. Leiterman, a presentation,
14 which, as he himself says, is somewhat beyond what we
15 came here to discuss. But he made that quite clear from
16 the beginning.

17 MR. LEITERMAN: Thank you for your
18 latitude.

19 THE CHAIRMAN: Are there any questions
20 which anyone would like to put? Dr. Wilson.

21 DR. WILSON: It's not a question and
22 perhaps I should leave this to the Chair, but I think
23 the person who has intervened should have some
24 explanation of our relationship to the expected Canadian
25 review of energy policy and our actions in that regard.



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1 THE CHAIRMAN: Yes, I would be happy to do
2 that. Mr. Leiterman is quite correct that in one sense
3 our terms of reference are comparatively narrow. We are
4 asked to ascertain whether the present proposal or
5 alternative to it could provide a safe means of
6 disposing of Canada's nuclear waste. And that is still
7 the open question, of course.

8 There are, as I think I mentioned in an
9 opening statement yesterday, many other matters of
10 importance and concern with respect to nuclear energy
11 and in fact the generation of electrical energy as such
12 in Canada.

13 There are at present quite intensive
14 discussions going on within Ottawa which I hope will
15 lead in the near future to some progress on looking at
16 the wider issues. And I know that members of this panel
17 are every bit as interested as you are in having that
18 wider examination of the environmental and health
19 effects of the various means of generating electricity,
20 including, of course, nuclear means, examined carefully.

21 And our hope would be that if that goes
22 ahead with a reasonable time frame and on a reasonable
23 basis, that will help to put our admittedly somewhat
24 narrower mandate into a broader perspective, and it's
25 that broader perspective in which you, I think, are very



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1 interested.

2 We take note of your request that we seek
3 a review of our own mandate. I will certainly discuss
4 that with members of the panel, but I must say that my
5 present inclination is to express the strong hope and to
6 do what I can to bring that about, that the broader
7 review be undertaken in probably a separate form from
8 this one.

9 MS. ROY: I would like to take benefit of
10 your presence here, as you said, as a Canadian citizen
11 to ask you a question.

12 We often hear arguments around this issue.
13 People don't want to support the risk related to the
14 management of radioactive waste but they want to benefit
15 from the electricity generated by nuclear plants. How
16 do you pose this problem, this kind of problem, as a
17 Canadian citizen.

18 MR. LEITERMAN: I think the panelist has
19 accurately pointed out the great anomaly of our time.
20 We all want nuclear power -- excuse me, we all want
21 power, we want the benefits of generated electric power,
22 and we are unwilling to face the costs. And I think the
23 existence of this panel is a very heartening indication
24 of a change in our society which is gradually taking
25 place in which we are as a society more and more ready



1 and willing to examine the costs and to face them.

2 As an individual, I believe that the risks
3 of nuclear power are far too great for us to continue
4 down the path we have gone so far and that it is time
5 for us to stop and to turn back that nuclear clock and
6 that we must accomplish this by other means which I am
7 sure have been discussed and are very widely understood
8 by the members of the panel and by much of the general
9 public.

10 It is I suppose too easy to say that
11 conservation is the greatest weapon we have in our
12 battle -- in the battle that all of us face to adjust
13 our consumption of energy to our willingness to face the
14 consequences of its generation.

15 However, there is little question in my
16 mind that if we were willing to spend upon educating the
17 public a fraction of the resources which, for example,
18 the nuclear industry spends on defending the uses of
19 nuclear power, if we were willing to spend those
20 resources on the education, that the results would be
21 amazing.

22 I think we are all of us amazed at the
23 extent to which the public has grasped the need for
24 environmental controls, has shown individual
25 willingness, my goodness, to segregate garbage. There



1 are five garbage cans in my kitchen for different -- I
2 mean, I personally laughed at such matters less than ten
3 years ago.

4 So, I have been educated. I think we can
5 all be educated. And I think conservation is a method
6 that is under-utilized, although I would like to here
7 congratulate Ontario Hydro for the extent to which they
8 have begun to embrace and spend money on publicizing the
9 value of conservation.

10 But the resources which this country
11 spends on the examination of the other alternatives to
12 nuclear power, in particular, solar, wind generation,
13 tidal; all of which we know require a vast amount of
14 resources to develop before they can become economical,
15 but I think all of us sense that there are possibilities
16 there which would allow us to phase out nuclear, as
17 other countries are doing.

18 And I have only to look at, you know, a
19 calculator, a pocket calculator, a wrist watch, powered
20 by the light of a 10-watt bulb or a candle,
21 economically, which I can buy for \$20, manufactured in
22 Japan, to recognize that there are possibilities in
23 solar power which are yet to be explored, and I think
24 those are the directions that we must look.

25 And the reason I feel that panels like



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1 this should attempt to broaden their terms of reference
2 is so that we just don't get on the express train and
3 say, 'Well, we've got nuclear. Ontario Hydro is
4 building more, unlike jurisdictions in many other
5 important countries who have examined it. We are going
6 full steam for nuclear in Ontario and this panel is
7 going to find a way to "safely" dispose of the waste.'

8 Let's stop and examine whether we can cut
9 down on the waste. We are going to have enough trouble
10 getting rid of what they have already generated in
11 nuclear waste, let's not continue to add to it and talk
12 as a nuclear industry does about the day when 60, 70, 80
13 per cent, 90 per cent of the power needs of Ontario,
14 will be provided by nuclear power because everyone in
15 this room, I feel, knows in their heart that there will
16 be a Chernobyl, there will be other Chernobyls, besides
17 the one we've had.

18 We have all heard the assurances that
19 there isn't a chance in a thousand and so on. We all
20 know the limitations of technology and human engineering.
21 It will happen. This country should not be saddled with
22 nuclear reactors close to major cities. If we must have
23 them, they shouldn't be close to cities. And we should
24 work towards the day when we can phase them out. Thank
25 you.



1 THE CHAIRMAN: Thank you very much, Mr.
2 Leiterman.

3 ---Mr. Leiterman withdraws.

4 THE CHAIRMAN: If there are any further
5 participants who would like to address the panel this
6 morning...

7 Could we make sure we have a name please
8 for the record. Thank you.

9 PRESENTATION BY MS. FARLINGER:

10 My name is Shirley Farlinger. I am a
11 member of a group called Science for Peace, and I did my
12 science studies at the University of Toronto. I also
13 belong to the United Church of Canada.

14 One of our leading scientists is Ursula
15 Franklin who is a professor of metallurgy and earth
16 sciences, recently retired, and I wish to pass on advice
17 from her to the panel. Her advice is very simple:
18 minimize disaster; do not maximize gain.

19 I think this applies very well to what
20 you're looking at. I understand that one of the things
21 we are doing this morning is giving advice to the panel,
22 so I am going to frame my words along those lines.

23 I think it's important when
24 representatives of companies like Wardrop speak to you
25 that you have a clear understanding of how they benefit.



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1 What government subsidies, what tax rebates, what grants
2 do those companies receive from the government.

3 Mr. Card mentioned that economics is
4 important, and I do think it is, but that aspect of
5 economics must also be looked at by the panel. When you
6 talk of the cost of nuclear power, too, you must also
7 talk about the total cost.

8 I know that the Canadian Institute of
9 Chartered Accountants is now redesigning its accounting
10 methods so that it will take into account environmental
11 factors, new environmental accounting. So perhaps you
12 would like to get someone from that group to explain how
13 that alters the cost estimates that you have probably
14 been given for nuclear power.

15 There has been talk about finding
16 alternatives and the fact that if you do not bring down
17 a recommendation to support AECL's program, that you
18 must tell the people exactly what you will do, what
19 alternatives there are. Well, you cannot find what you
20 have not yet looked for. And in many cases scientists
21 have not yet looked for alternatives. Over 50 per cent
22 of scientists in North America are involved in military
23 production and military research. It is not possible
24 for them to be unbiased, so I ask you to guard against
25 that.



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1 As far as Lac du Bonnet is concerned, I
2 guess you should know how much American financial
3 support that research facility has already received and
4 is likely to receive in the future. What agreements has
5 Canada signed in this area?

6 Now, people speak of jobs. One man spoke
7 of a hundred thousand employed. This is minuscule, of
8 course, to the jobs that can be generated from both
9 cleanup of the environment and the use of alternate
10 technologies for generating energy.

11 He also spoke of people having to
12 feel good about what goes on. I am sure the people of
13 Chernobyl also thought there would be cost benefits. I
14 recently heard the head of the Ukraine speak at the
15 United Nations at the U.N. Summit for Children, and he
16 said that 60,000 children had been irradiated and that
17 the Dnieper - I guess that's how you say it - River has
18 been contaminated and it is a source of drinking water
19 for 35-million people, so it is not possible to look at
20 this as far as the effects go in a narrow context.

21 I am very concerned that your findings
22 will be used to justify a greatly increased number of
23 nuclear facilities in Canada and around the world. I
24 hope you can guard against that. Perhaps you will be
25 able to agree to some of AECL's recommendations; but at



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1 the same time, I think you have to point us in a
2 non-nuclear future.

3 We in the peace movement have not
4 frivolously used public funds and we are not here today
5 to frivolously use up your time. There is a recent
6 article which I will pass on to you about the estimated
7 present cleanup cost of cleaning up nuclear disposal
8 problems in the United States. It runs into the
9 billions of dollars - and I'm sorry I didn't bring it
10 with me - but most of this happened because there
11 weren't citizens' groups looking at this and protesting
12 it.

13 Now we are. It's too bad that we are
14 billions of dollars late, in the United States at least,
15 in doing this. I don't want that to happen here. I
16 think the cheapest thing to do is to listen to the
17 citizens' groups now and not go ahead with further
18 nuclear power.

19 A lot of waste disposal has been done in
20 secret. The morning Globe and Mail gave an instance of
21 a Russian ship which was carrying nuclear waste which
22 sank and has now been discovered. So in Russia there
23 are tremendous environment problems and also in the
24 United States, so I ask that what happens in Canada not
25 be kept secret.



1 I find it strange that you are asked not
2 to examine alternatives and yet you are asked to give a
3 detailed concept if you reject the AECL concept. I also
4 finds it ironic that you speak of a need to help our
5 First Nations and you do not also bring to light the
6 fact that uranium mining health problems have been
7 suffered by indigenous peoples around the world as well
8 as in our own uranium mines in Canada.

9 Thank you very much.

10 THE CHAIRMAN: Thank you, Ms. Farlinger.

11 Are there any questions which members of
12 the panel would like to put to Ms. Farlinger, seeing we
13 have her present. Dr. Wilson.

14 DR. WILSON: It's not a question but
15 simply a comment of clarification for the record. My
16 question to the previous person about the cost benefits
17 to the communities that would host the waste, and I
18 suggested that we also include the cost benefits for the
19 industry, and you have made that same point.

20 What I am meaning are the cost benefits,
21 say to Wardrop and so on, and companies that benefit
22 from the industry because I think for any comparison
23 that needs to be included, so thank you for that
24 reminder. And I wanted to put that in the record for
25 clarification.



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1 MS. FARLINGER: It's not just cost benefit
2 but I guess also the impossibility of offering an
3 unbiased opinion.

4 THE CHAIRMAN: Thank you very much indeed
5 Ms. Farlinger.

6 ---Ms. Farlinger withdraws.

7 PRESENTATION BY MS. GILCHRIST:

8 Good morning or good afternoon. My name
9 is Madeline Gilchrist. I am a member of Voice of Women,
10 national group of women working for peace and
11 disarmament. I am also an international lobbyist for
12 peace and disarmament, which means lobbying
13 decision-makers at NATO, Warsaw Pact, Congress people in
14 the U.S., the U.N. Disarmament in Geneva. I'm also a
15 nurse.

16 I come from Switzerland originally, a
17 beautiful country like Canada, much smaller. Something
18 happened in Switzerland a couple of years ago. The
19 people of Switzerland through their democratic process
20 voted against nuclear plant. Swiss people have this
21 marvellous democratic thing. They can vote and they can
22 elect. And I am wondering what the people of Canada
23 would do if it would take in their hands their right to
24 vote, which is to create an initiative or referendum.
25 By that you would not have hearings like we have here



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1 today because people would go and vote for it.

2 I will also speak to you in my language,
3 which is women's language, which is the everyday, what
4 people think about it, it's common sense, and it means
5 enough is enough.

6 I will also challenge the terms of your
7 reference for your committee or panel which is far too
8 narrow and also would like, as mentioned by the former
9 speaker, the gentleman there, to be also broadened, that
10 your mandate should be broadened because it is
11 absolutely pointless to discuss nuclear waste if it is
12 to produce more nuclear plant.

13 And we should first irradiate and get rid
14 of nuclear plant which is a disease - don't forget I'm a
15 nurse - then to discuss of nuclear waste which are the
16 symptoms. Because only talking about nuclear waste
17 management is a task of creating more nuclear reactor.
18 And with nuclear wastes, you talk about the technical
19 argument instead of having a principle argument, so this
20 is going to be my comment to this last minute comment.

21 Thank you very much for listening to me.

22 THE CHAIRMAN: Thank you, Ms. Gilchrist.

23 Any comment or question from members of
24 panel to add to that? (No response)

25 Thank you very much for appearing.



1 If there are no further participants
2 willing to join us now, I would declare this session
3 closed. But just before doing so, I would like to thank
4 all of you who have made presentations and have
5 participated in the three sessions of our scoping
6 meetings over yesterday afternoon/evening and this
7 morning.

8 I can assure you that they have all been
9 listened to most carefully by members of this panel.
10 Where there have been written submissions, we will have
11 the opportunity to study them again; and, of course, we
12 have the transcripts available to us which we will be
13 looking at.

14 Your very active and thoughtful
15 participation is of great help to us as we try to get
16 our collective minds around the question of what we
17 should require to be put to AECL in establishing its
18 environmental impact statement. And, of course, in so
19 doing, we are inevitably looking at wider questions than
20 that and putting that question into the broader context.

21 That you very much indeed for your
22 assistance and we now close this session in Toronto and
23 we will be moving on to other centres in Ontario and
24 other provinces over the next few weeks to hear the
25 views of citizens and interested associations there.



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1 Thank you very much.

2 ---Whereupon the hearing was adjourned at 10:30 a.m.

3

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5

I certify the foregoing as a true and
accurate computerized transcription of
the proceedings, to the best of my skill
and ability.

6

Karen Maxwell.

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Karen Maxwell,
Court Reporter.

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FEDERAL ENVIRONMENTAL
ASSESSMENT REVIEW
OFFICE

BUREAU FEDERAL
D'EXAMEN DES EVALUATIONS
ENVIRONNEMENTALES

Held at: Robert McLaughlin Gallery
Oshawa, Ontario

Date: Tuesday, October 23, 1990

Volume No.: 3

B E F O R E :

MR. BLAIR SEABORN	Chairman
MS. LOUISE ROY	Member
DR. LOIS WILSON	Member
MR. PERTER van VLIET	Member
DR. LIONEL REESE	Member
DR. LOUIS LAPIERRE	Member

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HEARING BY THE FEDERAL ENVIRONMENTAL ASSESSMENT
REVIEW OFFICE ON NUCLEAR FUEL WASTE MANAGEMENT.

SCOPING MEETING

.

Hearing held at the Robert McLaughlin
Gallery, Oshawa, Ontario, on Tuesday,
October 23, 1990, commencing at 7:00 p.m.

VOLUME 3

B E F O R E :

MR. BLAIR SEABORN	Chairman
MS. LOUISE ROY	Member
DR. LOIS WILSON	Member
MR. PETER van VLIET	Member
DR. LIONEL REESE	Member
DR. LOUIS LaPIERRE	Member



(i)

A P P E A R A N C E S

DANIEL	Canadian Nuclear Society
HELEN MACDONALD	Private Citizen
ROBERT SCULTHORPE	Citizens for Responsible Nuclear Waste Disposal in Hope Township, Port Hope Community Liaison Group
JOHN VELDHUIS	Port Grandby, Newcastle Environment Committee, Garbage of Ontario Diminished
IRENE KOCK	Nuclear Awareness Project
ERNIE BROWN	Private Citizen
GORDON TURNBALL	Private Citizen



(ii)

I N D E X O F P R O C E E D I N G S

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P a g e N o .

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Robert Sculthorpe	40
John Veldhuis	55
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Ernie Brown	75
Gordon Turnball	79



1 ---Upon commencing at 7:00 p.m.

2 THE CHAIRMAN: Good evening, ladies and
3 gentlemen. It seems scarcely necessary in a room of
4 this size, but maybe the acoustics require the
5 amplification. Let's try it anyway. Thank you for
6 turning out this evening. Welcome to the scoping
7 meeting being held by this Environmental Assessment
8 Panel, which is being created to review the nuclear fuel
9 waste management and disposal concept. The Panel was
10 appointed by the Minister of the environment, the
11 Ministry of the Environment in October of 1989.

12 I would like to introduce the members of
13 the Panel who are with us this evening. At your right
14 and my far left Louis LaPierre, a professor in the
15 department of biology at the University of Moncton.
16 Also chairman of the environmental council of New
17 Brunswick.

18 Next to him is Dr. Lionel Reese, a
19 physician at St. Joseph's Hospital in London Ontario,
20 professor in the department of diagnostic radiology and
21 nuclear medicine at the University of Western Ontario.

22 To my immediate left, Mr. Peter Van Vliet,
23 a mechanical engineer from Regina, a member of the
24 Senate of the University of Regina.

25 To my right, immediate right, Dr. Lois



1 Wilson, president of the World Council of Churches and
2 co-director of the Acumenical Forum of Canada, who is
3 based living in Toronto.

4 Next to Dr. Wilson, Louise Roy, an
5 environmental and public affairs consultant residing in
6 Montreal. Ms. Roy is currently vice president of the
7 Quebec Foundation of the Environment, and a member of
8 the Canadian Environmental Assessment Research Council.

9 My name is Blair Seaborn. I'm chairman of
10 the Panel. I reside in Ottawa. I'm retired, but I
11 served previously as Deputy Minister of the Environment,
12 and after that Canadian chairman of the International
13 Joint Commission.

14 I would also like to introduce, so you
15 know who all the players are here, the out of town
16 players, the panel secretariat, Mr. Bob Greyell, who is
17 sitting at this table. He's the executive secretary of
18 our panel.

19 At the back of the room, some of you have
20 met her, Ms. Susan Toller, environmental analyst, who is
21 assisting the Panel and both of whom, of course, will be
22 there and available to provide you with any information
23 or help you with any need regarding this review.

24 The review is being conducted in
25 accordance with the Federal Environmental Assessment



1 Review Process. The process ensures that the
2 environmental implications of proposals for which the
3 federal government has decision-making powers are fully
4 considered as early in the planning process as possible
5 and before irrevocable decisions are taken.

6 I hope that some of you may have had the
7 opportunity to receive information on this review
8 process, and on the proposal of Atomic Energy of Canada
9 Ltd. at the open houses which were held in May and June
10 of this year.

11 The Panel has been asked in part to
12 examine the nuclear fuel waste management and disposal
13 concept, which is a proposal for permanent disposal of
14 used nuclear fuel deep in the rock of the Canadian
15 Shield. This proposal will see the used fuel sealed
16 inside corrosion resistant containers and placed in
17 holes drilled in the floor of a room inside a disposal
18 vault. The vault would in some ways resemble a deep
19 mine and would contain the used fuel in an area of
20 approximately four square kilometres.

21 I would like to say a few words about the
22 Panel's mandate. The terms of reference state that the
23 Panel is to review the safety and acceptability of the
24 concept for geological disposal of nuclear fuel wastes
25 in Canada, as proposed by Atomic Energy of Canada Ltd.



1 Additionally, a broad range of nuclear
2 fuel waste management issues, including long-term -
3 management, transport and environmental, social and
4 economic affects, are included in this review. Since
5 site selection will not occur until the disposal concept
6 has been accepted as safe, the Panel will not consider
7 any specific sites, but will review the potential
8 availability of sites and the methodology required for
9 site characterization.

10 I would also like to say a few words about
11 what is not in the Panel's mandate and will not be
12 addressed in this review. The energy policies of Canada
13 and the provinces; the role of nuclear energy within
14 these policies, including the construction, operation
15 and safety of new or existing nuclear power plants; fuel
16 reprocessing as an energy policy; and the military
17 applications of nuclear technology. All of these are
18 specifically excluded from our terms of reference.

19 I wanted to be quite clearly understood,
20 however, that all the members of this panel are very
21 much aware of the broader concerns related to the use of
22 nuclear materials, even though the mandate we have been
23 given is a more specific and a narrower one.

24 I understand that there are at this
25 present time intensive discussions going on between the



1 Departments of -- Energy, Mines and Resources and
2 Environment in Ottawa, that those discussions are
3 progressing quite well concerning a broader review of
4 the health and environmental implications of the variety
5 of methods we have for generating electricity. My hope
6 is that these discussions will very soon result in
7 getting that review underway. That is the broader one
8 which we will be expected to address in some of the
9 questions which have been excluded from our mandate.

10 The purpose of these scoping meetings is
11 to allow participants to identify issues that need to be
12 addressed in the Environmental Impact Statement that
13 will be prepared by AECL. The Panel is not requesting
14 the presentation of opinions on the substance of the
15 disposal concept at this time. Public hearings will be
16 held later to discuss whether AECL's proposal is
17 acceptable. The scoping meetings, of which this is one,
18 enable participants to assist the Panel in identifying
19 the issues that are of concern and the questions which
20 need to be answered.

21 Following these meetings, the Panel will
22 prepare draft guidelines for the preparation by AECL of
23 the Environmental Impact Statement. We will invite
24 public comments on these draft guidelines over a period
25 of at least thirty days. After consideration of these



1 comments, the Panel will finalize the guidelines and
2 issue them to AECL.

3 When AECL has completed its Environmental
4 Impact Statement, and I should stress that that is a
5 process which may well last a year to a year and a half,
6 because there will be very heavy requirements on them to
7 come up with a very comprehensive statement. When they
8 have submitted it to the Panel, that document, the EIS,
9 will be available for at least a ninety day period of
10 public review.

11 To assist in the evaluation of the
12 scientific and technical matters, a scientific review
13 group of very distinguished independent experts has been
14 established by this panel to examine the safety and
15 scientific acceptability of AECL's disposal concept. A
16 report of their findings and recommendations will be
17 submitted to the Panel, who will distribute that in turn
18 to the public. The public will share with us the
19 material which we receive from that group.

20 Once the Panel is satisfied that AECL has
21 addressed satisfactorily all the items identified in the
22 guidelines, we will hold a series of public hearings.
23 Participants then will be asked to discuss the
24 acceptability of AECL's disposal concept in detail. The
25 Panel will consider all comments submitted to it, and



1 after listening and digesting those comments, will
2 prepare its report to the Ministers of Environment and
3 of Energy, Mines and Resources.

4 The present scoping meetings will be
5 conducted according to the meeting procedures which were
6 published on August the 24th, 1990. The Panel would
7 appreciate it if review participants would restrict
8 themselves to the identification of the issues within
9 the Panel's mandate.

10 I ask that those registered to speak
11 attempt to summarize their concerns in 15 minutes,
12 unless they have previously requested an additional ten
13 minutes. The Panel will pay equal attention to written
14 and oral statements.

15 Participants who have registered in
16 advance will be asked to present their views to the
17 Panel. The Panel may ask questions of clarification
18 following each of the presentations, such as the ones we
19 will hear this evening. Anyone who would like to make a
20 presentation to the Panel but has not yet registered,
21 may speak to either the Panel secretary, Mr. Greyell, or
22 Ms. Toller, now or at a coffee break, which I hope to
23 have about halfway through this meeting.

24 We will do our best to accommodate those
25 who have not registered, but this may of course depend



1 on the time remaining at the end of the meeting. We
2 will see how we get along.

3 Court reporters will record the
4 proceedings of each meeting. Transcripts will be made
5 available to designated libraries. A compilation of
6 written submissions will also be available from the
7 Federal Environmental Assessment Review office located
8 in Ottawa.

9 We shall accept written submissions
10 identifying issues. That in addition to that which we
11 hear at the Panel meetings, the scoping meetings, any
12 time up until November 30th of this year.

13 May I call now on the first...

14 FROM THE FLOOR: Excuse me, sir, we would
15 like to speak out about this program.

16 I would like to speak with you tonight,
17 ma'am. As you know, Green Peace is boycotting these
18 hearings. We are calling on you as a member of this
19 panel to also boycott these hearings.

20 The terms of reference for these public
21 hearings are far too narrow. They do not distinguish
22 between current and future nuclear waste. We first have
23 to discuss the issue of nuclear power and not agree to
24 expand the nuclear industry in Canada. Then we can
25 consider a discussion about how to dispose of the waste.



1 I call on the members of this panel to
2 request all levels of government to widen the terms of
3 reference for these hearings.

4 SPEAKERS FROM THE FLOOR: No more nuclear
5 reactors, no more waste. No more nuclear reactors, no
6 more waste. No more nuclear reactors, no more waste.
7 No more nuclear reactors, no more waste. No more
8 nuclear reactors, no more waste. No more nuclear
9 reactors, no more waste. No more nuclear reactors, no
10 more waste. No more nuclear reactors, no more waste...

11 THE CHAIRMAN: You heard that intervention
12 by Green Peace. We have noted it, of course. They made
13 the same point with strength and with conviction, I
14 know, at the first of our three meetings in Toronto
15 yesterday.

16 I have been asked to call first this
17 evening on Daniel Meraw of the Canadian Nuclear Society
18 to present the views of his group or of his own on that
19 respect.

20 Mr. Meraw?

21 PRESENTATION BY MR. MERAW:

22 Thank you. I appreciate the opportunity
23 to speak to you here tonight.

24 My first mistake in my presentation is I
25 assumed there would be an overhead projector, and there



1 obviously isn't. However, I hope you have a copy of
2 what would have been my overheads in front of you, and I
3 will try and go through them in order, so hopefully it
4 will help you follow what it is I wanted to say.

5 The first page is obviously just a cover
6 page. The second-page is kind of an overview of what I
7 wanted to cover tonight.

8 First I wanted to say a little bit about
9 the Canadian Nuclear Society. I think it is important
10 for you to know who it is that is here talking to you.
11 I also want to make sure you don't confuse us with the
12 Canadian Nuclear Association, which is a very common
13 mistake, and I will explain a little bit about that
14 later on.

15 The second point I want to talk about is
16 why environmentalists support nuclear power and a
17 nuclear waste management program. I realize this is not
18 to be covered -- this is not really an issue for the
19 scoping session, however I think it is important and it
20 is relevant to some of the issues that should be part of
21 the impact statement.

22 The third thing I want to talk about is
23 what issues some of us in the Canadian Nuclear Society
24 feel you should consider in the Environmental Impact
25 Statement. They all have a common theme. They centre



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1 around the concept of risk.

2 Clearly the reason we are having these
3 sessions is there is a risk of this technology, there is
4 a risk to the environment, there is a risk to people.
5 It is very important to understand those risks, what we
6 can do to minimize them, and very importantly the cost
7 associated with doing that, and lastly, how those risks
8 and costs compare to other waste management systems that
9 we have in Canada. Then I will try and summarize in the
10 conclusion.

11 The third page in talks a little bit about
12 the Canadian Nuclear Society. The Canadian Nuclear
13 Society is a society of individuals who have a common
14 interest in nuclear science and technology. There is
15 about 650 of us now. The society was formed in 1979.
16 It consists of engineers, scientists, technologists and
17 other professionals, the bulk of whom work or study in
18 the field of nuclear science.

19 Quite often we get confused with the
20 Canadian Nuclear Association, or the CNA, and that is
21 understandable, because they sound the same, and many of
22 us work for companies who are part of the CNA. However,
23 the major difference is that we are a technical society,
24 and we are a society of individuals.

25 Across Canada there is about 650 members,



1 and we are broken up into branches. We happen to be in
2 the branch called the Central Lake Ontario Branch, of
3 which I'm fortunate enough to be a member of and acting
4 as chairman this year. The branch runs from Pickering
5 on our west, to Peterborough on our north, to Port Hope
6 on our east; a fairly large area covering several areas
7 of nuclear interest.

8 The next slide was entitled "Why
9 Environmentalists Support Nuclear Power and," more
10 specifically and pertinent to this discussion tonight,
11 "Nuclear Fuel Waste Management."

12 The first key point is the low quantity of
13 waste that we are talking about. For 2,000 megawatts of
14 daily electricity production, if you do that production
15 with uranium, you would generate around two tons of
16 nuclear waste. If you do that production with coal, you
17 will generate 44,000 tons of waste, a obvious large
18 difference.

19 Two thousand megawatts of electricity
20 production is about the size of Ontario Hydro's
21 Pickering A or Pickering B generating station down the
22 road, or it is about the size of Ontario Hydro's Lamden
23 Coal Generating Station up in Sarnia. Nuclear power has
24 a very, very high density, is what we have referred to;
25 a lot of electricity for very little fuel and hence very



1 little waste.

2 The other important point about the waste
3 is that it is all contained. All the fuel waste, all
4 the nuclear fuel waste produced in a nuclear reactor is
5 contained at the station. You can contrast this with
6 the waste that we produce at our coal generating
7 stations. The waste from our coal station is by now
8 uniformly distributed around the globe.

9 And not finally, but third I think, and
10 another important one is the amount of carbon dioxide
11 produced at a nuclear station. There is none.

12 We think this is very important to the
13 idea of waste management, on the assumption that we need
14 electricity in our society today and in the future, and
15 I think that is a sound assumption. I know there would
16 be a great discussion about how much we need, but
17 assuming we need some, we think nuclear power is a very,
18 very strong contender for producing that. However, we
19 must find an acceptable, an environmentally acceptable
20 way to manage the fuel.

21 That is going to involve some sort of
22 technology, and AECL will be making that proposal. What
23 I want to talk about is the risk associated with that
24 technology.

25 It is rather obvious to say, but we



1 sometimes forget it. There is no such thing as a 100
2 per cent safe technology. We talk about unsafe
3 technologies, and we should have safe technologies, but
4 there is no such thing as a 100 per cent safe
5 technology.

6 If you just think of the transportation
7 industry, you can walk, you can ride a bicycle, you can
8 ride a horse, you can ride in a car, you can fly an
9 airplane. None of them are 100 per cent safe.
10 Certainly some of them are more safe than others, but
11 there is a risk of injury in any of them.

12 All technologies involve a degree of risk
13 to people and also to the environment. However the risk
14 can be controlled. It cannot be eliminated, but it can
15 be controlled.

16 What is important, I think, is to
17 understand what we mean by risk and to attempt to
18 quantify it. The conventional definition of risk that
19 is used in a lot of risk analysis is that risk is made
20 up of two components. First of all, there is the
21 consequence of an event, and second of all there is the
22 probability of that event occurring. If either of those
23 two are high, it is a good chance that you have what we
24 call a risky event. If either/or both of them are low,
25 there is a good chance that you have a very low risk.



1 However, it will never be zero. We can never eliminate
2 risk.

3 On the next slide I attempt to show a
4 graph to emphasize this concept, where I have graphed
5 probability on the vertical axis and consequence of an
6 event on the horizontal axis. Both axis increase left
7 to right and top to bottom. On it there is a line drawn
8 on it. Everything above that line is what we could say
9 is an unacceptable risk, and everything below the line
10 is acceptable.

11 That is true if we are talking about a
12 safe technology. A safe technology is one in where the
13 very serious consequence has a very low probability.
14 Much lower than the events which are deemed to be not so
15 serious.

16 For example, in the nuclear industry, if
17 we were to have an accident that involved significant
18 fuel damage, and some of that fuel damage ended up with
19 release of contamination to the environment, that is a
20 very serious accident. Therefore the probability of
21 that must be kept as low as possible, such that the
22 probability of the event times the seriousness or the
23 consequence of the event ends up in a low risk.

24 The nuclear industry, certainly in the
25 generation end, is licensed by the Atomic Energy Control



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1 Board under such principles, and I'm sure that these
2 principles will be used in the waste management program.
3 What is important is that we define the risk, define the
4 acceptable risk that we are shooting for in this
5 technology.

6 Obviously we should keep the risk low, and
7 risk can be reduced. We can reduce risk by adding
8 protective barriers to reduce the consequence of the
9 event. In the generation of the power, that is done by,
10 for example, a reactor containment building. In the
11 waste disposal, there will be methods of containing the
12 spent fuel. That is a protective barrier, which will
13 reduce the consequences of an accident.

14 We can also reduce the risk by adding
15 multiple barriers; more specifically multiple
16 independent barriers. Again, in a nuclear generating
17 station, instead of just one system to shut down the
18 reactor, we'll have two. Therefore the probability that
19 a reactor fails to shut down is significantly reduced.
20 Therefore, since the probability is reduced, the risk is
21 reduced.

22 The nuclear industry also uses the
23 so-called ALARA principle, a-l-a-r-a; as low as
24 reasonably achievable. The vast majority of our time is
25 taken up by discussing what do we mean by reasonable.



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1 Everyone has a different opinion of what the term
2 reasonably achievable is.

3 I think it is very important, in the
4 environmental assessment hearings, that we come up with
5 a definition or a quantification of what we consider to
6 be reasonable. Therefore the first item that I would
7 suggest that the Environmental Impact Statement must
8 define is what low level of risk is reasonable for any
9 nuclear fuel management proposal.

10 When we talk about risk and making it low,
11 we would be remiss not to talk about the costs
12 associated with reducing these risks. The two go hand
13 in hand. All technologies can be made to have a lower
14 risk by improving the effectiveness of the protective
15 barriers or by adding multiple barriers. Again, I have
16 shown a graph with three risk lines on it. Each one is
17 lower to the left, each one has a lower risk than the
18 previous one. However, each one has a higher cost. If
19 we want to reduce the risks, we invariably have to spend
20 more money.

21 A concept which I'm familiar with in the
22 Ontario Ministry of the Environment, I don't know if it
23 is a concept that is in the federal ministry, but it
24 probably is, is the so-called BATEA, B-A-T-E-A. That
25 stands for best available technology economically



1 available. We want to use the best technology to lower
2 our risks, but it must be economically available.

3 Therefore, when we are studying risks in
4 this Environmental Impact Statement, I suggest you must
5 address the issue of risk reduction costs and what is
6 economically achievable. A key factor in any
7 technology, in any engineering decision, is one of cost.
8 It is not the most important, but it certainly is a key
9 one, and it is one that tends to get overlooked.

10 The third item that I wanted to talk about
11 is the risks and the costs of other waste management
12 systems. And by other waste management systems, I mean
13 municipal waste landfill sites, toxic chemical
14 incinerators, or any other that you can think of.

15 At first glance these have nothing to do
16 with nuclear fuel waste. However, we do live in a
17 worlds of finite resources. And when you stop and think
18 about it, if we use too many resources in the wrong
19 place, it is going to detract from other areas. And we
20 want to make sure we put our money where it is most
21 needed. In order to do that, we really have to take a
22 look at and compare them.

23 So I suggest that the last thing that I
24 think you should look at is let's address the issue of
25 comparative risks and comparative costs of a nuclear



1 fuel waste disposal system to other important waste
2 disposal systems.

3 So if I could summarize, there are three
4 points that I hope I have been able to make, that I
5 would like you to consider. In the Environmental Impact
6 Statement, I think we have to define what low-level of
7 risk is reasonably achievable for any nuclear fuel
8 management proposal.

9 In doing that, the impact statement must
10 address the issue of risk reduction costs and what is
11 economically achievable for any nuclear fuel waste
12 management proposal.

13 And lastly, the impact statement must
14 address the issue of comparative costs and risks
15 relative to other waste management systems.

16 Thank you.

17 THE CHAIRMAN: Thank you, Mr. Meraw, for
18 that very straightforward statement of your position.

19 You would mind staying there for a moment?
20 I give the opportunity to Panel members to put any
21 points to the participants, in case there is some matter
22 of clarification which would be helpful to us. I don't
23 know if that is the case, but just hold on for a moment,
24 if you would.

25 Any questions? Dr. LaPierre?



1 DR. LaPIERRE: Mr. Meraw, thank you for
2 your presentation. I have one question on the quantity
3 of waste produced.

4 You indicate in your slide that uranium
5 produces two tons of waste for megawatts of electricity
6 produced versus 44,000 tons for coal. Are you including
7 in that the mining waste and the production waste?

8 MR. MERAW: No, I am not.

9 DR. LaPIERRE: Isn't there a difference if
10 you add those figures together?

11 MR. MERAW: There probably is. I didn't
12 include the mining waste for uranium, and I didn't
13 include the mining waste for coal.

14 DR. LaPIERRE: No, but it is somewhat
15 different.

16 MR. MERAW: I hasten to add, I also didn't
17 take into account that in that two tons of waste in
18 uranium, there is a lot of it that is, if we choose to
19 take the effort to recover it, would not be waste.

20 I was making the assumption, though, that
21 we would not, and that the fuel bundles, as they come
22 out of the reactor, would be disposed of without any
23 further processing.

24 THE CHAIRMAN: Any other comments or
25 queries to put to Mr. Meraw?



1 Mr. Van Vliet?

2 MR. VAN VLIET: Mr. Meraw, you have a
3 formula here on risk quantification, the risk of an
4 event equals the probability of the event times the
5 consequence of the event. It seems rather simple.

6 How does one quantify the probability and
7 the consequence of the event, so that one can put
8 quantity of statement?

9 MR. MERAW: I will try to answer that.
10 Probability is a number between zero and one, and on my
11 graph you will see that the -- and usually when we are
12 talking about low probabilities, we are talking, the
13 numbers that I have shown here, I have considered a high
14 probability as ten to the minus three. That is one
15 event in a thousand. And a low probability is ten to
16 the minus seven. That is one event in ten million.
17 Anything below ten to the minus seven, the industry
18 refers to it as incredible. It won't happen.

19 The way you come across those kind of
20 events, in some areas it is very easy. If you have an
21 event which occurs with a fairly high, fairly high
22 frequency, you can count the number of opportunities for
23 the event, the number of times it actually occurs, and
24 then just divide it up. If you have a very large
25 population, it is easy to come across the probabilities.



1 If you have a very small population, it is not so easy.

2 The consequence is also sometimes a
3 difficult number to come across. The nuclear industry
4 is the only one that I have any experience with, and I
5 know that that is done by -- we usually speak of the
6 consequences in terms of radiation dose to the
7 environment. So that is easy to quantify. You can
8 measure how much radiation dose ends up in the
9 environment.

10 What affect that radiation dose has on the
11 environment, you have to go back to some limited
12 historical data, such as the effects after the Hiroshima
13 bomb, the effects after nuclear testing, the effects in
14 the laboratory. However, those numbers do exist. So
15 you can come up with a -- the consequence, you can come
16 up with a, for example, a health impact to the public.

17 THE CHAIRMAN: I was about to ask that
18 question. Not only radiation doses to the physical
19 environment, but to the human portion of that
20 environment, to human beings as well.

21 MR. MERAW: Actually, I think we have
22 better, better data on the impact to people than we
23 actually do, unfortunately, on the impact to
24 environment.

25 THE CHAIRMAN: Thank you.



1 Dr. Wilson?

2 DR. WILSON: I'm interested that you
3 mentioned, as an environmental issue, what is
4 economically achievable, and I'm wondering if you feel
5 in the Environmental Impact Statement there should be a
6 comparative? I think you said there should be a
7 comparative cost between the geological waste
8 depository, including the construction operation, and
9 the security and the monitoring and the emergency and
10 other costs.

11 I'm wondering if you would also think it
12 useful to have such a costing for the on-surface monitor
13 disposal units. That is of a retrievable nature, which
14 we already have several instances around. You didn't
15 mention that in your paper. What did you mention here?
16 Municipal waste landfill sites.

17 MR. MERAW: And what was the...

18 DR. WILSON: I'm looking at other waste
19 disposal systems. Well, one that is in place now.

20 MR. MERAW: I wouldn't limit it. What is
21 important is that we do a comparison to something that
22 we can quantify. There are some of those that probably
23 the costs and the risks are not presently quantified and
24 would be very difficult to do a comparison to, and I
25 don't think we would achieve much. But hopefully there



1 are some that are not like that, where we do have the
2 data, and we should compare to those.

3 I think it is very important that we put
4 our effort to protect the environment in the right spot,
5 and how will we know if it is in the right spot, if we
6 are not comparing all our systems?

7 DR. WILSON: So you would include the
8 present on surface monitor disposal units.

9 MR. MERAW: Sure.

10 DR. WILSON: Thank you.

11 THE CHAIRMAN: Any comments?

12 No further inquiries from the Panel.
13 Thank you very much indeed, Mr. Meraw, for the
14 presentation.

15 MR. MERAW: Thank you.

16 ---Mr. Meraw withdraws

17 THE CHAIRMAN: Could I call next on Ms.
18 Helen Macdonald to speak to us?

19 PRESENTATION BY MS. MACDONALD:

20 I'm not sure whether I should apologize at
21 the outset. After listening to your opening remarks
22 about what is not your mandate, I have addressed some of
23 those issues, but rather than confusing my presentation,
24 I'm just going to go ahead and proceed with some of
25 those in any case.



1 As a resident living in Newcastle, which
2 is the home of the Darlington nuclear generating
3 station, I wish to address some broad issues of concern
4 to myself and my family regarding the mandate of this
5 panel and the mandate of the scientific review board.

6 I wish firstly to thank the Panel for
7 holding a meeting in a location central to the nuclear
8 corridor of Southern Ontario. Within a very short
9 distance of approximately 100 kilometres are situated
10 the uranium refinery in Port Hope, the Darlington
11 nuclear generating station and the Pickering nuclear
12 generating station, notwithstanding the Port Granby
13 low-level radioactive waste site in the town of
14 Newcastle, and numerous other Scarborough area low-level
15 radioactive waste sites.

16 Recognizing that the problem of
17 radioactive waste, whether it be high level or low
18 level, has not been resolved anywhere on the globe, I
19 wish to make the general thrust of my comments to the
20 issue of expansion of the nuclear power option.

21 By the very creation of this panel to
22 address a singular option for disposal of nuclear waste,
23 it is clear to me that the vast quantities of nuclear
24 waste which have thus far been generated are a serious
25 issue. I think we all here agree with this. However, I



1 believe that the methodology of dealing with nuclear
2 waste has been terribly flawed.

3 I would like to make an analogy. The
4 general population of Ontario, in fact across North
5 America now, is only beginning to come to grips with the
6 current garbage crisis. Barges are traveling the oceans
7 of the world loaded with tons of refuse created by our
8 disposable consumer oriented society, looking for a
9 depository. Municipal governments are forecasting trash
10 piling up in our parking lots and school yards as early
11 as 1992.

12 Because our refuse is left at the curb,
13 out of sight and out of mind, we absolve ourselves of
14 any responsibility for the disposal of the waste. Once
15 placed on the curb, it becomes the property of the local
16 municipality and disposal is then the responsibility of
17 the local municipality, also.

18 However, waste disposal has traditionally
19 not been a popular or sexy political or technical issue,
20 and that includes nuclear waste. Therefore, during the
21 past many, many years, our elected representatives have
22 neglected to prepare for new landfills or undertake
23 significant waste reduction initiatives, through
24 education in the three Rs. I'm not sure if you are
25 familiar with the three Rs, but they are reduce, reuse



1 and recycle.

2 We continue to create waste without regard
3 to where it is or is not going. The same could be said
4 to be true of the disposal or non-disposal of nuclear
5 waste. Scientists and politicians have hastily promoted
6 nuclear power with no apparent regard for the waste
7 generated. Thus we have a crisis on our hands. We have
8 vast quantities of highly hazardous waste, which will
9 remain so for a period that is far beyond my ability to
10 comprehend, for anyone else in our society.

11 What do we do with these highly hazardous
12 wastes? Perhaps then I would suggest the question which
13 should be pursued is, are we ready for nuclear power?
14 Clearly we are not and certainly never were.

15 Indeed in the federal courts in the
16 eleventh hour, it was strongly recommended that until
17 such time as we have developed a safe means of storing
18 nuclear waste, there must be a moratorium on any further
19 expansion of the nuclear power option.

20 As I understand it, this panel has been
21 given the mandate to review the nuclear fuel waste
22 management and disposal concept, with the terms of
23 reference for the scientific review group to conduct a
24 specific, indepth examination of the scientific and
25 engineering aspects of the concept, which is to be



1 developed by the Atomic Energy of Canada Ltd. to,
2 dispose of high level nuclear fuel waste in the igneous
3 rock in the Canadian shield.

4 I'm sure you have gathered by now, I'm not
5 a technical or engineering expert, but my question to
6 you is are no other options being pursued? When
7 undertaking an environmental assessment in the province
8 of Ontario, a proponent must place on the table more
9 than one disposal site, and more than one means of
10 disposal. Should this panel not recommend mirrored
11 requirements for the siting of a high-level nuclear
12 waste site?

13 As you are probably aware, and I believe
14 that it was alluded to earlier in the opening remarks,
15 the siting task force for low-level radioactive waste
16 has undertaken an extensive siting process, which has
17 involved all 850 municipalities in Ontario, as a
18 requirement of siting. This is not a singular selective
19 process.

20 Furthermore, when siting a waste disposal
21 facility, and I'm going back again to the non-nuclear
22 kind of waste, a proponent must address the three Rs
23 hierarchy; again reduce, reuse and recycle, and there is
24 now the new age thrust to the fourth R, refuse.

25 It seems to me that these are simple,



1 straightforward and perfectly sensible approaches to
2 effective waste management. I would like to suggest
3 that permanently disposing of high-level nuclear waste
4 deep in the Canadian Shield is not waste management.

5 Again, this brings us to us waste disposal
6 only, with the simplistic, out of sight out of mind
7 approach. Why not develop a safe means of storing the
8 waste, where they are accessible to future generations,
9 with the hope that they may have the wisdom to properly
10 manage the technology which we clearly are not yet
11 prepared for. By permanently berming the waste in the
12 shield, we are assuming that future potential for
13 retrievability is not a viable option.

14 Isn't this a rather magnanimous
15 assumption? Who would have guessed in 1900 that we
16 would be able to communicate via satellite, or that man
17 would fly, or that Neal Armstrong would have been able
18 to proudly step on the moon with his statement, "One
19 giant leap for mankind"?

20 Another area of concern to me, and I'm
21 going to address these in point form, is that of safety.
22 Public safety, environmental protection and safety of
23 technology:

24 (1) High level nuclear wastes are stored
25 on-site at the nuclear generating stations at this time.



1 Should they be transported to a location elsewhere, such --
2 as the Canadian Shield, will proposed transportation
3 undergo full environmental, socio and technical impact
4 assessment?

5 (2) Isn't it about time that a
6 comprehensive baseline health study were undertaken for
7 the nuclear power establishment? This would encompass
8 more than the worker health studies undertaken. I would
9 suggest it would include a large sampling of the
10 residents living in each nuclear community. Of course,
11 should the waste be transported, baseline health studies
12 along the transportation routes would be compulsory.

13 (3) There is intense concentration of
14 nuclear-related industry along the Southern Ontario
15 corridor, which gives me some concern. The synergistic
16 relationship of the economic and environmental impacts
17 has not been thoroughly studied, and I believe Mr. Meraw
18 alluded to that.

19 In other words, is the value of nuclear
20 power such that it overrides all environmental impacts
21 current and future? Two very recent occurrences bring
22 these matters to the fore.

23 At the end of August, a tornado struck the
24 eastern fringes of the town of Newcastle, including a
25 trip through our family property. The impact of the



1 tornado was not of the degree which we saw in 1985 in
2 Barrie. However, having borne witness to the
3 destruction which can be quickly inflicted, I was
4 reminded how significant we and all our technology are
5 in the grand scheme of things.

6 Furthermore, just last Thursday, or in
7 fact Friday morning, an earthquake, which I felt,
8 because I was up, shuttered through the Ottawa/Toronto
9 corridor. We are not above human error in the
10 management of the nuclear industry, and we most
11 certainly have no control over the natural elements.
12 Will natural impacts be reviewed in the siting of a
13 facility and the transportation of the wastes?

14 (3) Will there be put into place a
15 comprehensive compensation package, in the event of any
16 personal impacts, such as loss or damage? And that is
17 through the removal of the waste, decommissioning of the
18 waste and transportation of the waste.

19 I would suggest that such compensation be
20 separate and apart from the current, what I believe to
21 be, inadequate compensation for nuclear accidents, as
22 this is an entirely different matter.

23 (4) Is your review also encompassing
24 future decommissioning of the various nuclear
25 facilities? They themselves will be a monumental waste



1 site. In other words, once the nuclear generating
2 stations are decommissioned, will they be classified as
3 permanent disposal facilities for high- and low-level
4 radioactive wastes?

5 (5) Along with baseline health studies,
6 will detailed emergency plans be created for the event
7 of an accident at the disposal, or what I like to call,
8 at a storage facility, or during the course of
9 transportation of the wastes.

10 (6) Although I do recognize that we the
11 taxpayer ultimately pays for all costs associated with
12 the nuclear industry in some form or another, I would
13 like to suggest that as Ontario Hydro is the generator
14 of the waste, Ontario Hydro should therefore be
15 responsible for the cost of disposal or storage of the
16 waste. The fact that one-half of the energy produced in
17 Ontario is nuclear energy provides further rationale to
18 this argument.

19 (7) It is my hope that during the course
20 of the review, a complete inventory of all high-level
21 nuclear waste be drafted and provided to the public.
22 This further commands the question of tridium and
23 associated waste. Are these materials included in the
24 review? Are accurate records kept of the amount of
25 waste disbursed into the environment? I consider



1 radioactive -- the controlled releases of radioactive
2 steam to be dispersal of waste into the environment, as
3 well as tridiated water, which is regularly dumped into
4 Lake Ontario.

5 In summary, I wish to emphasize the
6 following. That the siting process be undertaken with
7 comprehensive assessment of all alternatives, not just a
8 singular concept approach. This would entail inclusion
9 of the four Rs approach to management and storage of
10 waste, as opposed to disposal of the waste.

11 The issue of decommissioning has yet to be
12 thoroughly addressed. This review, I believe, provides
13 the ideal opportunity to begin that addressing.

14 Last week I had the privilege of attending
15 a conference which featured keynote speaker William L.
16 Rathje, who's the director of anthropology at the
17 University of Arizona. Mr. Rathje is the world's
18 leading expert in the study of modern landfills.

19 In his opening remarks, Mr. Rathje
20 discussed the joy of undertaking archaeological digs in
21 ancient ruins, which in reality is the study of waste
22 left by previous civilizations. He presented the
23 audience with a slide of one of the greatest monuments
24 of the Aztec civilization. I'm sure you are all
25 familiar with the Temple of the Sun.



1 His next slide presented the audience
2 with a testament to our civilization. The monument was
3 a California landfill, which was in fact larger than the
4 Temple of the Sun.

5 What is the significance of this
6 observation? With great confidence, Mr. Rathje extols
7 the virtues of four Rs waste management. The four Rs
8 management, rather of waste resources; reduce, reuse,
9 recycle and refuse, and moralizes on the values of
10 retrievability, accessibility and ongoing monitoring of
11 our resources. He does not call it waste.

12 Should we be treating our nuclear waste or
13 resources any differently? I wish to borrow some
14 principles currently under review for environmental
15 strategy in the province of Ontario, which I believe are
16 good aids in environmental decision-making. I trust you
17 will take them into consideration in your deliberations.

18 (1) Act with a respect for nature and
19 future generations.

20 (2) Live off the interest, not the
21 environmental capital.

22 (3) Anticipate and prevent problems.

23 (4) Include environmental costs in the
24 price of all goods.

25 I think it goes without saying that most



1 of you are familiar with these kinds of principles, and
2 by virtue of your position on the Panel are interested
3 in pursuing them.

4 I'd like to thank you for your time, and I
5 hope that I will be provided with a copy of your report
6 upon the completion.

7 I just wanted to finish, I just wanted to
8 make a point regarding nuclear waste. If this were my
9 garbage, and I brought it here, I generated this waste
10 in my home, and I brought it here and left it, and then
11 left the meeting, I would not be acting responsibly
12 about the waste I generate or about its disposal. And I
13 feel that the same holds true for the nuclear waste. I
14 feel it is very important that before we generate the
15 waste, we have got to know what we are dealing with
16 before we put it on the curb.

17 Thank you.

18 THE CHAIRMAN: Thank you, Ms. Macdonald.
19 You have raised, of course, brought to our attention a
20 number of the questions which we are grappling with
21 right now, and a number which we will have to come to
22 decisions on as we hear from various interested parties
23 across the country. before we take our next steps, it
24 would obviously be premature to attempt to respond at
25 this stage.



1 I would, however, I think like to draw
2 your attention to the opening paragraph of the terms of
3 reference for this panel, which does make it clear that
4 we are to undertake a review of the AECL concept of the
5 geologic disposal of nuclear fuel wastes in Canada,
6 along with a broad range of nuclear fuel waste
7 management issues. And that we are specifically
8 enjoined to look at nuclear fuel waste disposal being
9 developed elsewhere in the world, i.e., we will
10 undoubtedly be taking a look at a number of
11 possibilities, as we get further into our work.

12 I don't think it would be correct for me
13 to attempt to go into more detail at this stage, but I
14 wanted to make it quite clear that it does go beyond
15 just a precise proposal from AECL. Of course that one
16 will form an important part of our deliberations.

17 Now are there some questions or comments
18 from panel members?

19 Mr. Van Vliet?

20 MR. VAN VLIET: Ms. Macdonald, you made
21 two statements, and I have difficulty correlating those.
22 Perhaps you can clarify them.

23 MS. MACDONALD: I will try.

24 MR. VAN VLIET: In the last one you showed
25 the bag on the chair, and you indicated that if you left



1 that bag here, and it was garbage, that we might not be
2 very pleased.

3 Somewhere earlier in your presentation,
4 you made a distinct point that indicated that we should
5 leave the disposal of nuclear fuel waste that is being
6 used as a result of the energy generation process to
7 future generations. Is that not --

8 MS. MACDONALD: No, that is not what my
9 intent was.

10 MR. VAN VLIET: Two opposing views.

11 MS. MACDONALD: It is two opposing views,
12 but it is not the intent.

13 As I indicated, I'm not an expert and not
14 great at putting together formal presentations.
15 However, what my Intent of that statement is, that we
16 should not be putting it out of sight, out of mind.
17 Once this goes to the curb, it is gone, and I don't feel
18 I have to worry about it. I feel that by burying the
19 waste in a fashion where we can't see it, or we can't
20 deal with it or retrieve it at a later time, there may
21 be a solution for, we may need those wastes at some
22 point in the future, for perhaps generating energy, and
23 I think it would be rather remiss not to have available
24 to future generations. It may be a resource to them.

25 MR. VAN VLIET: So rather than leaving it



1 where it is today, you are suggesting --

2 MS. MACDONALD: A storage.

3 MR. VAN VLIET: -- we should store it in a
4 manner that is retrievable, if necessary.

5 MS. MACDONALD: And monitored, yes.

6 MR. VAN VLIET: And monitored.

7 MS. MACDONALD: And accessible.

8 THE CHAIRMAN: Are there other issues?

9 Ms. Roy?

10 MS. ROY: I just want to make sure. I
11 think you emphasize a comparison, on a comparison that
12 should be made between a centralized option and a
13 decentralized option. Disposal or any other means of
14 managing the waste in a centralized site, opposed or
15 compared to storage on-site of the nuclear plant.

16 Is that what you mean? Would you like to
17 see those two options compared, so that you could have a
18 good idea of what are the risks and the impacts of a
19 centralized options for managing waste and a
20 decentralized one?

21 MS. MACDONALD: I'm having trouble
22 understanding centralized and decentralized, but I think
23 what I am trying to say, I have concerns about it being
24 transported, you know, from hither and yon, firstly.

25 Secondly, I don't know if we have the



1 technology to be leaving it sitting on the shore of Lake
2 Ontario, through a number of facilities which are very
3 close. I can't answer it. I don't know which way I
4 support, to be honest with you. I think we all need
5 more information. I am sorry.

6 MS. ROY: Just to clarify centralized and
7 decentralized, because may be my knowledge of English
8 make me choose the wrong word, but what I mean is
9 concentrating the waste on one site, comparing to
10 having, let's say, more than one site, where you can
11 manage it.

12 MS. MACDONALD: That is the fear with
13 general waste management now. Rather than have
14 landfills, you know, in tiny pockets all over the
15 province or wherever, the idea is to have a central
16 waste management facility, whether it includes landfill
17 or all the other options.

18 MS. ROY: So would you like to see these
19 two options compared, or isn't that?

20 MS. MACDONALD: I think that would be a
21 goods thing to do, yes.

22 MS. ROY: Thank you.

23 THE CHAIRMAN: No further comments? Thank
24 you very much indeed, Ms. Macdonald, for your
25 presentation.



1 ---Ms. Macdonald withdraws.

2 THE CHAIRMAN: We are following not
3 entirely the order which was originally suggested.
4 There were a couple of requests for changes. I wonder
5 if Mr. Robert Sculthorpe would now be prepared to come
6 forward with his presentation.

7 Thank you.

8 PRESENTATION BY MR. SCULTHORPE:

9 Good evening. I'm Robert Sculthorpe.
10 Although I am the spokes person for Citizens for
11 Responsible Nuclear Waste Disposal in Hope Township, and
12 a member of the Port Hope Community Liaison Group, which
13 has been struck by the secretariat of this siting task
14 force for low-level radioactive waste, I am speaking
15 tonight as a citizen of Canada. The opinions I express
16 and the questions I raise are my own.

17 In my opinion, we need to responsibly
18 dispose of the nuclear waste, and it is in this light
19 that I want to raise three issues. They are, first of
20 all:

21 The involvement of the local community
22 that is going to host this facility;

23 Secondly, the monitoring and
24 retrievability of the waste, once it is in place; and.

25 Thirdly, the ACB and its communication



1 problem, as I perceive it with the public.

2 I feel these issues need to be addressed
3 by the hearings, as their resolution will to a large
4 extent determine if the facility is actually
5 constructed.

6 Now I'll speak to the first one. I would
7 like to recommend that the copies of opting for
8 co-operation and the relevant supplementary reports to
9 be read by all the participants involved in this hearing
10 process. Please take note that in this recommended
11 process opting for co-operation, the local communities
12 become involved and participate and even lead at times
13 the decisions leading to the siting and operation of the
14 facility. This is very important.

15 In my opinion, if this does not occur, an
16 adequate comfort level will never be attained in the
17 local community to allow the construction to go ahead.
18 The local people have to have a level of meaningful
19 control of the facility in there midst. It cannot be
20 run by some nameless, faceless entity in Ottawa and be
21 locally acceptable.

22 The second issue I raise, the issue of
23 monitoring and retrievability of the waste. We the
24 general public know that Murphy's Law holds true. The
25 nuclear engineers and scientists have not learned how to



1 stop it. We have seen this recently, because of the
2 incidents at Three Mile Island and Chernoble. I realize
3 there is a big difference in the technology used in a
4 reactor as compared to a waste facility, but it is
5 thought that what can go wrong will go wrong.

6 With this basic idea in mind, the concept
7 of passive disposal, a passive disposal system, without
8 adequate monitoring and procedure for remedial action,
9 if the facility does not operate as it should, is just
10 not acceptable. Design work must be done to adequately
11 monitor the facility, with such things as perhaps
12 monitoring chambers around the chamber that the waste is
13 in, or tunnels to allow for inspection of the facility
14 and to ensure that there are no leaks.

15 As well the design work must be done so
16 that there is a safe system of retrieval of the waste.
17 This is necessary so that if the contamination starts to
18 migrate, the waste can be removed and relocated, or the
19 facility can be repaired and the waste be redeposited.
20 We need to know that the system has been designed to
21 accomplish this, and we need to know what the financial
22 cost would be for such an exercise, before the facility
23 is built.

24 No. 3, the ACDM communication. As a
25 member of the Port Hope Community Liaison Group, I have



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1 had the pleasure of hearing presentations on the health
2 risks due to low-level radioactive waste from the AECB
3 and from Rosalie Burtelle on separate occasions. In my
4 opinion, the AECB presentation insulted the intelligence
5 of the people attending, and road rough shot over their
6 emotional concerns. Rosalie Burtelle's presentation
7 presented a rational argument, which both assumed we
8 were intelligent and was respectful of our emotional
9 sensitivities.

10 I am aware that she's not respected by the
11 nuclear establishment, and I don't want to go into this
12 issue here. But the AECB has a lesson to learn, and
13 they could learn it from her if they choose to.

14 What we are dealing with in this whole
15 issue of nuclear technology is the trade-off between
16 improved standard of living versus disease, dying and
17 death. This is a trade-off that raises a lot of
18 uncomfortable emotions, one of the big ones being fear.
19 Fear for one's self, fear for our children, fear for our
20 families and friends. These are motherhood issues. The
21 AECB has demonstrated that they do not address these
22 issues effectively or with sensitivity and respect.

23 The whole nuclear establishment does not
24 deal with these genuine concerns adequately. If this
25 process that we are going through right now and the -



1 hearings here are going to end with the successful
2 construction of a facility, these concerns must be
3 addressed with respect by the proponents and the
4 regulator. In my opinion, the AECB and the proponent
5 must become aware that these concerns are real. They
6 must accept that when working with people, perception is
7 reality. They should hire appropriate experts to assist
8 them in understanding the concerns of the public and how
9 to address them in a meaningful fashion.

10 I would like to add an aside, seeing as
11 how this is a motherhood issue. That the largest pool
12 of talent on motherhood issues is mothers. And I'd like
13 to suggest that the nuclear establishment hire more
14 mothers and participate in the dialogue with the general
15 public. In this way perhaps the issues can be addressed
16 in a fashion that we all can relate to and understand.

17 As I said at the beginning, in my opinion
18 the nuclear waste needs to be disposed of responsibly.
19 The issues I have raised should be addressed by these
20 hearings, if we are going to achieve this goal of
21 responsible disposal.

22 Thank you for your attention.

23 THE CHAIRMAN: Thank you, Mr. Sculthorpe.
24 You I know are aware of the importance of specific
25 siting. It is not within our mandate to be choosing



1 specific sites. We are a long way from that, but
2 nevertheless I hope you are aware that we have been told
3 that we may review the methodology required to
4 characterize sites, or potential, and may also try to
5 establish general criteria for site selection and advise
6 the governments accordingly. So it is valuable to hear
7 what you have to say on that particular point. Thank
8 you.

9 Comments, questions from the other members
10 of the Panel?

11 DR. LaPIERRE: Mr. Chairman, I would just
12 like to ask one question regarding retrievability.

13 I understand from your comment that
14 retrievability should be an essential component of the
15 process?

16 MR. SCULTHORPE: I think it should be,
17 because if the system fails in any way, we should be
18 able to go in and repair it. With respect to the whole
19 issue of not dealing with specific sites and dealing
20 with this high level waste, I have tried to make my
21 comments general.

22 But we are dealing in Port Hope with
23 low-level radioactive waste, and one of the issues that
24 keeps coming back or keeps coming up in other
25 deliberations is what kind of technology we want to use,



1 and are we comfortable with the technology, which does
2 not allow us to easily repair a leak or a problem or a
3 failure with the system? It is a major concern to the
4 general public, and I think that we have to have a
5 system which, as we can assume will fail, and we have a
6 strategy to repair it if it does. That doesn't mean to
7 say we are designing it so it will fail, but there is a
8 method in place to deal with it.

9 THE CHAIRMAN: Thank you.

10 Mr. Van Vliet?

11 MR. VAN VLIET: Mr. Sculthorpe, we have
12 heard a number of participants address the issue of
13 retrievability and monitoring and accessibility. I
14 presume that it is assumed in there that the kind of
15 stable, social environment we have, government
16 stability, that that is a prerequisite to that
17 particular environment in terms of the retrievability.

18 If one would envisage, and it may not
19 likely be the case, but in many years hence that there
20 is a quite different social structure in Canada, or
21 someone wants to use that access for violent purposes,
22 blackmail or whatever, would your position still be the
23 same in terms of retrievability and accessibility and so
24 on?

25 MR. SCULTHORPE: I didn't address



1 accessibility. I think that the waste should be
2 separated from the human population.

3 At this point, short of firing it into
4 outer space, I don't see how we could guarantee that
5 with the technology that we have, that we have as man
6 kind, that we could prevent our society, let alone
7 another society, from regaining access to the material,
8 if they wanted to use it for military reasons. I think
9 it is very difficult to conceive how we could prevent
10 that.

11 My concern is that we have a system which
12 removes the waste from the general population, from the
13 area we live in, and which we can monitor. And we
14 could, I would think, just thinking about it now, design
15 a barrier between the waste, and if we are putting it in
16 caverns, the surface of the earth that would take a
17 level of technology which we in today's society have
18 mastered and would prevent someone or a society that was
19 less sophisticated from gaining access to it.

20 THE CHAIRMAN: Professor Wilson?

21 DR. WILSON: Since you mentioned the
22 involvement of the local host community, and since we
23 will be at some point looking at the criteria for this,
24 do you have some thoughts on what criteria would be
25 appropriate for a local host community for site



1 selection?

2 MR. SCULTHORPE: No, I don't. The issues
3 I raised were -- again goes back to our experience with
4 low-level waste in the Port Hope area, and a number of
5 people suggested that it should be sent up north or sent
6 down south or sent east or sent west. There is always
7 somebody living there, and that person is always a
8 constituent of an MP and has a direct line to Ottawa,
9 and so you have to come to terms with the local
10 community. And my suggestions and comments and the
11 issues I have raised were issues that have to be dealt
12 with in gaining a degree of public acceptance in the
13 local community, wherever it may be.

14 THE CHAIRMAN: Dr. LaPierre?

15 DR. LAPIERRE: You mentioned a document,
16 which I think is entitled "Optimum for Co-Operation"?

17 MR. SCULTHORPE: Yes.

18 DR. LAPIERRE: This is a document that is
19 published by the Ontario government, or...

20 MR. SCULTHORPE: No, the federal
21 government. Bob Greyell was very involved in it, I'm
22 sure. He can get you several copies.

23 DR. LAPIERRE: Thank you.

24 MS. ROY: I would like to go a little bit
25 further on those questions of acceptability and safety.



1 Do you have some thoughts on how to
2 address those issues of acceptability and safety that
3 could go further than talking about retrievability or
4 monitoring? That could be, let's say, in some way
5 speaking about acceptability or safety? Would you have
6 some thoughts on how to address those issues, maybe
7 related to your experience in Port Hope?

8 MR. SCULTHORPE: Well, the experience in
9 Port hope is we are just starting this process. So I
10 can't draw on the experience as having passed, because
11 we are just entering that stage in the process. So at
12 this point I really don't have hard ideas that I can
13 give you.

14 DR. WILSON: How about soft ones?

15 MR. SCULTHORPE: Soft ones? The soft ones
16 come back to the communication, and the fact that you
17 have to deal with the community with respect. As I
18 said, assume that the people are intelligent, and treat
19 their emotions and concerns with respect that they
20 deserve, instead of alienating them in the process of
21 siting comparable risks that are perceived by the
22 people, and we have experienced this fairly recently as
23 being risks that just didn't relate to what we were
24 dealing with. And it comes back to just respecting the
25 people.



1 MS. ROY: Thank you.

2 DR. LaPIERRE: I have some concern for
3 that comment, and one that goes back to your comment of
4 getting your message to the people.

5 You made a direct comment to AECB. What
6 do you perceive is the problem with AECB? Do you think
7 that they perceive that people cannot understand the
8 complexity of the problem, or they think that the
9 problems that people have are not real problems? They
10 are just perceived problems, and don't really need to be
11 addressed.

12 MR. SCULTHORPE: Probably both of those to
13 a certain extent.

14 In the discussions I have had with some of
15 the members of the staff of AECB, they have said that
16 the issue really comes down to educating the people.
17 But we experienced them trying to educate us, and most
18 of the people left that meeting frustrated, because they
19 related the risk of having a facility in your community
20 to the risk of dying -- because of the facility being in
21 your community, to the risk of dying if you went for a
22 weekend in New York City, or to the risk of eating
23 peanut butter sandwiches, and I have forgotten the
24 frequency, but those were the risks that they chose to
25 associate it with. And I will make a direct comparison.



1 When we were listening to Rosalie
2 Burtelle, she looked at it from the point of view of
3 having a population, and exposing that population to a
4 stress and observing symptoms. -And there may be many
5 symptoms before there is actually death, which is what
6 AECB looks for traditionally is for death. They don't
7 look for anything less than that. Until the person is
8 dead, they don't count him or her.

9 You know, as someone whose been farming
10 for a number of years, you know, I consider a drought
11 when my yield is reduced by 80 per cent. I hope to God
12 I don't experience zero yield before it is called a
13 drought. And to people who are parents and see stresses
14 on their families and see symptoms, there is a very
15 similar pattern that they observe, and it seems to
16 relate more to what we experience than eating peanut
17 butter sandwiches or going to New York City for a
18 weekend.

19 Now I don't know whether the numbers are
20 right. As I said in my presentation, I don't think
21 right now is the time to discuss, you know, Rosalie
22 Burtelle's arguments on the health risk of the
23 radiation, versus the AECB's. There is a different
24 forum for that.

25 But if you sit with a group of people



1 listening to the presentation, as I did, you come away
2 from one frustrated, and you come away from the other
3 one saying yeah, it seems to make sense. And if this
4 exercise we are all participating in is going to have --
5 is going to end up with the construction of a facility,
6 we are going to have to get the community that is going
7 to host the facility to feel comfortable with it. There
8 is going to have to be a degree of comfort or there are
9 going to be a lot of demonstrations. There have been
10 some already, and that is what I want to draw attention
11 to. I hope that answers your question.

12 DR. LaPIERRE: As somebody who was exposed
13 to both the AECB with an objective presentation, and to
14 Rosalie Burtelle with her usual showmanship and
15 subjective presentation, as a thinking citizen, and you
16 are suggesting that we should make sure that this
17 education process takes place in such a way as to make
18 people come back feeling good, she feeds on perception,
19 and her statements are not objective. It is very simple
20 to feed perceptions and come back and say yeah, yeah,
21 that is exactly what we mean.

22 The AECB, unfortunately, is stuck with a
23 problem of not dealing with perceptions and with fixing,
24 but trying to give you objective evidence. And I guess
25 the question I'd like to ask you, because this is



1 something that bothers me all the time, is how can you
2 approach the average citizen, and tell him facts that he
3 really doesn't want to hear, because he has another
4 perception that he wants fed? I'm just curious how you
5 could give me advice as to how you could do that
6 presentation better?

7 MR. SCULTHORPE: Very difficult question.
8 I will do my best.

9 The first thing is that when you are
10 dealing with people and politics, the unfortunate
11 reality is perception is reality. You have to work with
12 that.

13 I think in terms of giving the facts, they
14 have to be given in a context that people can relate to,
15 and in the specific examples I cited of peanut butter
16 sandwiches and trips to New York, they seem awfully
17 removed from having a perceived hazard in the middle of
18 your community, even if in fact from a statistical point
19 of view they are similar risks.

20 How to get it in that context that people
21 are comfortable with and familiar with I honestly don't
22 know, but it has to be, it has to be addressed. And my
23 suggestion, as I made, was to get more mothers involved.
24 Because perhaps if we get mothers who are presenting,
25 standing up in front of us as the people in the



1 communities, people of Canada, and presenting how they
2 personally have dealt with the emotional issues of these
3 risks with respect to their children and their families,
4 they will be able to describe it and present it in a way
5 that the rest of us can relate and understand.

6 THE CHAIRMAN: Thank you very much for
7 your presentation.

8 ---Mr. Sculthorpe withdraws.

9 THE CHAIRMAN: I think there might be
10 general agreement we take a five-minute break,
11 ten-minute break -- let's make it ten, for a cup of
12 coffee. We have been given a lot of food for thought,
13 but perhaps a cup of this or that wouldn't be a bad
14 idea. But I will make it a brief break, and I would ask
15 you to be back here as soon as you get the cup of coffee
16 or a stroll down the hall, as you wish.

17 ---Recess at 8:20 p.m.

18 ---On resuming at 8:42 p.m.

19 THE CHAIRMAN: I am sorry. I'm afraid
20 going beyond the rough deadline I imposed was my own
21 fault, I'm afraid, but there were two people that wanted
22 to speak to me during the coffee break, and I thought I
23 better attend to that. Sorry to have kept you a little
24 longer than I intended.

25 However, if we could resume the meeting



1 now, I have three more people so far who indicated that
2 they'd like to bring their thoughts to our attention.
3 The first of those will be Mr. John Veldhuis of the Port
4 Granby, Newcastle Environment Committee.

5 If Mr. Veldhuis, if you would come forward
6 and speak to the committee.

7 PRESENTATION BY MR. VELDHUIS:

8 Thank you, Mr. Chairman.

9 One of the problems of being later on on
10 the list is that other people have said everything, and
11 the Panel might find that I don't bring any new thoughts
12 to this panel. However, if I bring them up again, it is
13 probably because I too feel they are important.

14 I am the chairman of the Port Granby,
15 Newcastle Environment Committee, and also the chairman
16 of GOOD, which stands for Garbage of Ontario Diminished.
17 I have been involved in one way or another with the
18 nuclear fuel cycle, various aspects of it, and I too am
19 a member and former chairman of the Newcastle Community
20 Liaison Committee, dealing with the low-level
21 radioactive waste. And so those backgrounds will
22 undoubtedly shade some of my presentations and biases to
23 this panel.

24 I have no formal presentation but just
25 some thoughts which I'd like to pass on to the Panel,



1 and I think one of the first things that we need to look
2 at is safety considerations. Safety considerations, if
3 we are going to remove material, talking about
4 high-level fuel bundles, to the workers, but also to the
5 environment. That involves the transportation of this
6 material. And I think there are a number of people in
7 our community that are concerned with that, the safety
8 aspects of transportation.

9 That needs to be addressed in the
10 Environmental Impact Statement. Not only the method,
11 but also the route along which this material may travel.
12 Also time of day and how frequently. Will this be in a
13 convoy or will this be in sporadic methods? Also, will
14 rail or trucks be used? I think all of these things
15 need to be addressed.

16 Another thing that needs to be addressed,
17 one of the former speakers alluded to it, is the
18 decommissioning of the reactors, that is a large amount
19 of contaminated materiality, as well as the pools, the
20 water that has contained the fuel bundles, spent fuel
21 bundles up to this time, needs to be looked after as
22 well. What are we going to do with all of that? You
23 can't just leave it there.

24 I think it is also extremely important
25 that the Environmental Impact Statement contains some



1 sort of emergency or contingency plans should there be
2 any kind of spills or thrills along the way. And also
3 along with that, some kind of insurance or compensation
4 factors should there be an accident or release.

5 As far as the destination is concerned, I
6 believe that there should be adequate warning of the
7 people, so those who feel that they wish to remove
8 themselves from the route can do so. I think the
9 testing of the route should be done, testing of the
10 equipment, and I believe some of this has already been
11 done, but that I think is important. That will be part
12 of the statement.

13 As far as the site is concerned, I think
14 several members here have said that it should be a
15 voluntary site selection, and I concur with that. I
16 believe that we are way past the idea of the DAD
17 approach, where we determine where it ought to go, we
18 announce to the public, and then we try to defend it to
19 the best of our ability. Because in this area, at
20 least, it hasn't worked. All we end up with is
21 confrontation, antagonistic positions.

22 As far as back to the site then, it would
23 be voluntary. I believe the method of storage, and I
24 underscore storage, should be one that is retrievable
25 and correctable and should not be a disposal option.



1 With all of the arguments that have been
2 stated, I believe that, as Mr. Sculthorpe said, that the
3 things that can go wrong will go wrong, and the more
4 visible the material is, the more care we will tend to
5 take with it. Whereas if we make it less visible by
6 storing it underground or whatever, or making it in such
7 a way that it looks like a park rather than a disposal
8 site, we tend to put a false sense of confidence in the
9 minds of the people, and then it tends to relax their
10 vigilance and tends to then become a mismanaged site
11 rather than managed site.

12 I believe the hydrogeological safeguards
13 should be in place and should be addressed. Water is
14 always mentioned as being a real problem, not just
15 around here, but also in the Canadian Shield, if that is
16 the site that is ultimately chosen.

17 One other speaker addressed their remarks
18 to the geological factor, such as earthquakes, and I'd
19 like to add to that the faulting. I have been in rock
20 formations where I was told it is absolutely dry and
21 perfect, and yet I could see fault lines in the rocks.
22 Yet there was no flow of water, but what is it going to
23 be like in 10,000 years from now or even a hundred years
24 from now.

25 I think the sociological impact is



1 extremely important. Mr. Sculthorpe alluded to that,
2 the acceptance of the whole concept. These factors need
3 to be addressed. The perception, and I raised that
4 several years ago when we went through an environmental
5 hearing, perception is often much more strongly held
6 than the reality. The numbers sometimes are meaningless
7 to people who have a perception of fear or whatever.

8 Coming back then to the public input, I
9 believe the whole idea should be voluntary, somewhat
10 akin to the opting operating for co-operation that has
11 now at least been looked at by one member of the Panel.
12 The intervenor funding, I believe, should be in place,
13 and I think it is important to establish a baseline
14 health study before anything is done.

15 I think the health of people is of
16 paramount importance, and if we have solid evidence,
17 medical evidence of what the state of the health is, and
18 like Robert Sculthorpe mentioned, dead bodies do not
19 count, I'm talking about all the other early warning
20 factors that are to be considered and taken into
21 account, then we can say with confidence the new
22 facility had no negative impact on this community. But
23 if we don't have it. That fear will always be in the
24 back of our minds, and it will worry the people, and
25 once again, a perception becomes a reality. People will



1 look for the very problems that they are trying to set
2 aside.

3 I think this whole thing, and I'm sure in
4 having heard you, Mr. Chairman, explain it, it will be a
5 full scale environmental or earth hearing. I think this
6 is fantastic. It should not be shortened in any way.
7 The Ontario government sometimes goes through a
8 shortened version. I don't think it should be done for
9 a federal installation.

10 And I also think there should be some sort
11 of a monitoring committee, once the site has been
12 selected or before the site has even been selected, some
13 sort of monitoring committee made up of public or lay
14 people, who can draw from professionals for resources to
15 look at all of the factors. In other words, to continue
16 what you are doing here, to look at remedial action, if
17 it becomes necessary.

18 And finally, I think there should be a
19 board of directors, once the site has been established,
20 a board of directors should be established of local
21 people to look at the long-term care and corrections
22 that may be necessary; and continuous research should be
23 done, and the directors should identify what that
24 research ought to be and carry that out.

25 Adequate funding, I think, is the key to



1 the whole thing. If we don't have enough funding, then
2 we tend to do the cheapest way out, and cheap is not
3 always the best.

4 And finally there should be offsetting
5 compensation for people that are affected by the site.
6 What form and what amount that offsetting compensation
7 will be, I don't know at this particular point.

8 I hope that you will allow me some
9 latitude, because an earlier speaker made some
10 statements which I found extremely difficult to accept,
11 and I would like to take this opportunity to make a
12 couple of comments.

13 We are talking about the quantity of waste
14 was mentioned, and Mr. LaPierre, Dr. LaPierre mentioned
15 other things, was mining and refining waste taken into
16 consideration? and it was not. But I find the whole
17 concept a little difficult, because it is somewhat like
18 comparing a shotgun with an arrow. Both can kill you.
19 Both are deadly. Whether we are talking about a large
20 amount of concentrated waste or -- rather a small amount
21 of concentrated waste or a large amount of
22 non-concentrated waste, to me it makes no difference at
23 all. It should be completely erroneous in the
24 discussion here.

25 We are talking about contained fuel waste.



1 Wastes are contained, we were told, on the sites. This
2 is what we are talking about. We are talking about
3 moving it. This is the whole purpose of it. So again I
4 don't see the relevance of that in this deliberation.

5 Tridium obviously was not considered,
6 accidental spills and releases obviously were not
7 considered.

8 There was talk about the risk of injury,
9 and I ask the question, which is more dangerous, a
10 low-tech or a high-tech? For example if you walk into a
11 tree, or you drive or fly into a tree, walking into a
12 tree is low-tech, driving or flying into a tree is
13 high-tech. There obviously is a difference. The
14 results are different. And when we are comparing risks
15 of injuries, are we comparing apples with oranges, or
16 are we talking about something that is totally
17 unrelated?

18 The probabilities of a risk or an
19 accident, I just draw your attention to Chernobyl and
20 Three Mile Island, and I do not need to say more.

21 The reactor safety is not part of this
22 mandate, I believe, as I understand it anyway. So
23 again, I don't know what bearing that had on the
24 deliberations. Nor do I see any relevance of landfill
25 sites, other than to illustrate that waste is produced



1 in all sectors of our society.

2 I just wanted to also point out, while we
3 are talking about landfill sites, that we have a goal in
4 this province of a 50 per cent reduction by the year
5 2000. I wonder if that is also true of the nuclear
6 industry?

7 THE CHAIRMAN: Thank you, Mr. Veldhuis.
8 Are there any questions of clarification
9 which members of the Panel would like to put to this
10 participant?

11 If not, thank you very much indeed, Mr.
12 Veldhuis.

13 ---Mr. Veldhuis withdraws.

14 THE CHAIRMAN: I would call next on Ms.
15 Irene Kock of the nuclear awareness project.

16 PRESENTATION BY MS. KOCK:

17 Good evening, Mr. Chairman and Panel
18 Members. Thank you very much for the opportunity to
19 address you this evening.

20 My name is Irene Kock. I'm executive
21 director of the Nuclear Awareness Project.

22 Nuclear Awareness Project is a citizens
23 group that works on a whole range of nuclear issues. We
24 pride ourselves on looking at the entire nuclear fuel
25 chain from beginning at uranium mining, to its end, and



1 all the end uses for radioisotopes.

2 I'm here representing over 800 members and
3 supporters from across Ontario and some other provinces,
4 as well as our two affiliated groups, Durham, Nuclear
5 Awareness and Bruce Nuclear Awareness, both located in
6 Ontario.

7 First I would like to present our comments
8 on the terms of reference of this environmental
9 assessment review process, and then I will identify some
10 of the issues which we feel must be included in the
11 Environmental Impact Statement.

12 It is my understanding that you wished all
13 the comments to be focused on your specific mandate, but
14 I hope you will bear with me while I discuss the more
15 fundamental issue of the terms of reference.

16 As you know from correspondence sent to
17 you last August by several environmental groups,
18 including ourselves, we feel that there has been an
19 inadequate amount of time allotted to preparing for
20 these scoping sessions, and we had requested an
21 extension that the scoping sessions be delayed. So
22 since they were not delayed, and since we were unable to
23 drop other commitments, my comments are in effect at a
24 very general level and quite limited. I'm hoping that
25 now that I know of your November 30th deadline, I may



1 elaborate on some of those in writing at a later date.

2 Nuclear Awareness Project believes that
3 the terms of reference for the review are too narrow to
4 allow for this very important issue to be addressed
5 completely. Specifically we find it is unrealistic to
6 try to separate nuclear waste disposal issues from the
7 broader questions of nuclear power production. Again,
8 this theme has been heard before this evening, and I'm
9 sure was heard yesterday as well.

10 To deal with this problem,
11 environmentalists have suggested to the federal
12 government that separate hearings on the broader
13 question about future energy policy be organized to
14 precede these hearings that we are addressing here this
15 evening.

16 The most fundamental principle of waste
17 management is reduction at source, whether we are
18 talking about hazardous chemicals or municipal or
19 radioactive waste. There is no question of the existing
20 waste. Existing high-level nuclear waste will pose a
21 problem in decades to come, and that eventually a
22 decision about where to permanently store these wastes
23 will have to be made.

24 However, the option of not producing more
25 high-level waste is not being considered here, and we



1 would suggest that these other hearings must address
2 this issue first.

3 A broader enquiry into our energy policies
4 needed to weigh the benefits and risks of not producing
5 more wastes versus continuing to depend on nuclear
6 generated power. The former environment minister,
7 Benoit Bouchard, stated in his announcement on the
8 formation of this panel, and I quote:

9 "I fully agree with those organizations
10 and individuals who have asked that these
11 important matters be addressed. To that
12 end my colleague, the Minister of Energy,
13 Mines and Resources, Jane Epp, and I have
14 agreed that it would be useful to
15 encourage broader public discussion of
16 these issues in a more appropriate form.
17 We will, therefore, in the months ahead,
18 be considering the most effective way of
19 launching such a discussion, of course on
20 energy policy."

21 One-half year later, in a phone
22 conversation with Mr. Greyell, of the Federal
23 Environmental Assessment Review Office, we were assured
24 that the federal government is committed to a broader
25 inquiry, and in fact Mr. Chairman, you yourself



1 reiterated that there is a commitment to this. It is
2 our hope that the Panel members will make every effort
3 possible to ensure that this broad review of future
4 energy policy take place.

5 Failure to have this review now before
6 this high-level waste review goes much further, will
7 only result in frustration and costly delays at a later
8 date, when the need for the broader review becomes
9 undeniable.

10 Now I have comments specifically about the
11 outcome of the process itself. It is stated in various
12 documents from the FEARO office that there are two
13 possible outcomes; either excepting the concept or
14 rejecting it, as being safe. We would like to suggest
15 that those are perhaps inappropriate outcomes for the
16 review. That rather the two possible outcomes would be
17 firstly rejecting the concept in that it is not safe; or
18 secondly, accepting the concept and then proceeding on
19 to assessment of the specific sites.

20 In other words, or to elaborate on that
21 second point, not to say that it is safe, period, but to
22 say that it is safe and we will now immediately address
23 the site specific question. And I've elaborated my
24 reasons for this comment in the handout I have given
25 you.



1 What is behind this basically is that we
2 have a fear that once the process is completed and a
3 decision is made, assuming that this process, this
4 concept of burial in the Canadian Shield is accepted,
5 that the nuclear industry will then state that the
6 situation has been solved. That in fact they have a
7 solution to the nuclear waste problem, before a site has
8 even been selected.

9 So we feel it must be made very clear that
10 upon the outcome of this concept being accepted, that it
11 is accepted in principle only, and that immediately the
12 site specific process has to proceed.

13 Another point I would like to make is on
14 the question of reviewing other possibilities for waste
15 management. Some of the ones I have listed in my notes
16 to you include on-site storage, reprocessing and
17 monitored long-term storage. I won't elaborate on that
18 any further, since other speakers have dealt with that
19 as well.

20 Another question which was raised by the
21 Lure (phoen) report is involving the credibility of
22 participants, and I wanted to address my concerns about
23 the credibility of the proponent in this case, Atomic
24 Energy of Canada Ltd. The Lure group report describes
25 AECL as being a crown corporation being involved in the



1 research and development of nuclear technologies. The
2 report, to my amazement, failed to mention that AECL is
3 also the promoter of these technologies.

4 It seems inappropriate, in our view, to
5 trust AECL with this job of developing waste disposal
6 plans, when the whole future of the nuclear industry may
7 depend on the outcome of this process. There is, in
8 other words, quite a conflict of interest going on here
9 in our view.

10 It would be in the interest of AECL to get
11 these questions solved as soon as possible, since the
12 whole question of high-level nuclear waste disposal is a
13 major stumbling block against the acceptance of nuclear
14 power in general by the public. What we are dealing
15 with, I propose, in the short-term is in fact a nuclear
16 industry public relations problem, not a nuclear waste
17 problem. And I will clarify that. The industry admits
18 that the wastes, as they are stored now on-site, are
19 quite safe for several more decades.

20 I would like to suggest that perhaps a
21 different agency should be handed the job of preparing
22 the Environmental Impact Statement.

23 Now I will just list a few of the issues
24 we would like to see included in the Environmental
25 Impact Statement. We feel it is important to have



1 estimations for the time frame that the proponent feels
2 they can guarantee the isolation from the environment of
3 the very long-lived radioisotopes, such as plutonium.
4 Of course a complete design criteria for the repository,
5 the site selection criteria is very important, and other
6 speakers have alluded to the siting process for
7 low-level waste, which is one model.

8 Also we want to emphasize that there be a
9 methodology set up for selecting the best possible site
10 and what the criteria would be for that. Of course, a
11 mechanism for short- and long-term environmental and
12 public health monitoring is a very important factor for
13 us.

14 Shipping and handling plans and emergency
15 response plans for accidents during shipping and
16 handling.

17 And last but not least, detailed
18 assessment of all the financial costs for the various
19 proposals.

20 I think I will finish there, ahead of
21 time. Thanks for your opportunity. I look forward to
22 receiving the guidelines.

23 THE CHAIRMAN: Thank you, Ms. Kock, for
24 this presentation. And I note that you hope perhaps to
25 find time to give us a more developed presentation,



1 although this one is to the point, before our November
2 30th deadline. That will be welcome, as well as any
3 other submissions that will be made in writing by that
4 time. Thank you.

5 Any comments, any questions from members
6 of the panel?

7 Dr. Wilson?

8 DR. WILSON: Just in your written
9 submission, I would be interested in some elaboration of
10 your other options.

11 MS. KOCK: Okay.

12 THE CHAIRMAN: Dr. LaPierre?

13 DR. LaPIERRE: Just one question. I just
14 want to make sure I understood your comment on the
15 managing of the waste disposal facilities, if there is
16 one. Did I understand correctly that you would wish the
17 management to be outside of AECL by an independent body,
18 or just preparation of the...

19 MS. KOCK: I think initially we would want
20 the proposal preparation to be somewhat arm's length.
21 The management of the facility, of course, would require
22 people knowledgeable in nuclear issues and monitoring,
23 what not. So that is I think a different issue. I
24 don't think I could comment specifically on that now.

25 DR. LaPIERRE: Do you have any idea who



1 this group could be, if not someone with knowledge of
2 the...

3 MS. KOCK: It may involve -- I haven't had
4 an opportunity to look in great detail at what the
5 scientific review group is mandated to do. In fact they
6 are supposed to, in my understanding, review what AECL
7 comes up with in their Environmental Impact Statement.

8 I would propose that an arm's length group
9 in fact be preparing that Environmental Impact
10 Statement, or be very much involved in that, because of
11 the vested interest that AECL has in solving this
12 problem. I don't have an easy answer for that.

13 DR. LAPIERRE: Thank you.

14 THE CHAIRMAN: Are there other questions
15 to Ms. Kock?

16 Mr. Van Vliet?

17 MR. VAN VLIET: Somewhere along the same
18 lines, with respect to the credibility of AECL, they are
19 the closest to the scene, and they have the body of
20 knowledge that is hard to duplicate elsewhere, although
21 there is a lot of expertise resident in the scientific
22 region group that reports to us, and the scientific
23 review group will help us in identifying the issues that
24 should be addressed in the Environmental Impact
25 Statement. So some of that may be addressed. AECL



1 being the designer and proponent, will have to be
2 accountable somehow.

3 I can't see how a particular outside
4 agency would step into the shoes of AECL and address
5 these issues in a way that would be credible to us. I
6 have some difficulties with that. On the one hand you
7 may say, well, that's putting the fox in the hen house,
8 but I still think the fox is in the best position to
9 judge what the position of the hen house is.

10 MS. KOCK: Unfortunately the panel and
11 intervenors are in somewhat a similar situation, in that
12 we are coming into this process some time after the
13 process has begun and in fact looking back at the plans
14 that have been set up and the work that has been done so
15 far. AECL has been working on their concept for over
16 ten years and has spent a great deal of time and energy
17 and money on it.

18 Perhaps part of what we can do in this
19 process is to recommend for future processes how this
20 might be set up differently at the beginning.

21 MR. VAN VLIET: Are you aware that they
22 also have a technical advisory group with outside
23 expertise, helping them in the development of these?

24 MS. KOCK: Yes.

25 MR. VAN VLIET: I can only think of one



1 other body that might be close enough to give us the
2 issuance, and that would be the corporations that
3 operate the facilities, such as Ontario Hydro, whoever
4 else operates this, but I can't see them jumping in and
5 volunteering this kind of activity.

6 MS. KOCK: The whole issue of the vested
7 interest involved here is, I would admit, a very
8 difficult one. We don't have any answer for it really.
9 We are just very concerned about that.

10 MR. VAN VLIET: I'd be interested if you
11 gave that some more thought.

12 MS. KOCK: Okay, I will.

13 MR. VAN VLIET: And give some suggestions
14 to the panel. Thank you.

15 THE CHAIRMAN: Thank you very much --
16 sorry, Ms. Roy.

17 MS. ROY: Does your comment about the
18 outcome of the process mean that from your point of view
19 the concept should be declared acceptable, and just even
20 when we could find a site for it?

21 MS. KOCK: In effect, yes.

22 MS. ROY: So the acceptability as to the
23 the concept, but also on the site selection.

24 MS. KOCK: Yes.

25 MS. ROY: Okay, thank you.



1 THE CHAIRMAN: Thank you indeed, Ms. Kock.

2 ---Ms. Kock withdraws.

3 THE CHAIRMAN: I have Mr. Ernie Brown, who
4 has requested to make a presentation next. Mr. Brown?

5 PRESENTATION BY MR. BROWN:

6 Mr. Chairman and members of the panel,
7 this is more in line of a letter I was going to mail,
8 but I wanted to make certain it got here, because I felt
9 it very necessary. So I would like to read this letter,
10 and then if there are any questions I could answer
11 afterwards, I would be perfectly willing to try it.

12 First of all, I would like to say that I
13 am a member of the board of the Liaison Community Group,
14 but my comments here are in no way to be reflected on
15 that group.

16 I would like to forward my opinion and
17 concerns regarding the deep cavern disposal of nuclear
18 fuel waste. I would like to start by making it quite
19 clear that I am speaking for myself, my family and my
20 grandchildren. I strongly believe that nuclear power is
21 the only solution for our electrical requirements now
22 and in the future, until a reliable substitute can be
23 developed. I do not work for or am associated with
24 Ontario Hydro or the nuclear industry in any way.

25 I am very concerned that the regulatory



1 document, R-104 by the AECB, promotes a serious tunnel
2 vision towards deep cavern disposal that will not allow
3 me to support this concept. It is very unfortunate that
4 our most knowledgeable people will not look at the
5 shallow- or above-ground disposal systems that other
6 countries are exploring. The out-of-sight out-of-mind
7 approach is in reality not what people I have talked to
8 want. I know they use the excuse that they do not want
9 to burden our future generations with having to monitor
10 and upgrade disposal areas in years to come, but this
11 type of thinking promotes an assumption that our future
12 children will not advance their knowledge any further
13 than we have today.

14 I find to deprive, under the disguise of
15 protection, future scientists of the right to address
16 the disposal problems of today and perhaps find a safer,
17 more sensible solution which could be of a real benefit
18 in their lives is very foolish. If we use the disposal
19 necessary for easy retrieval, monitoring, fixing
20 unforeseen problems and the possibility of much greater
21 safety in the future, then we are giving our future
22 generations an opportunity to guide man's future
23 properly. Future generations must not be almost
24 deprived of the opportunity of reclaiming what could be
25 a very scarce and valuable material by the AECB thinking



1 that deep cavern disposal is the only way.

2 How many years ago would we have taken the
3 possibility of man on the moon seriously? Should we
4 recognize the possibility that some child of the future
5 may well find a solution to nuclear waste disposal,
6 neutralization, et cetera, that our experts are missing
7 today? Should possible health and economic benefits of
8 retrieving the spent fuel material in the future be
9 impeded by the deep cavern disposal concept, which looks
10 like the ostrich approach?

11 The question that should be seriously
12 addressed by the public and experts is: Should we even
13 be looking at permanent deep cavern disposal today, or
14 should we be looking at temporary, meaning two to
15 perhaps five hundred years, safe above ground disposals,
16 until the technology advances to do the job right the
17 first time?

18 The health and safety affects at any site
19 should not be based on how many alleged persons might
20 die in a few million from radiation, but rather be based
21 on a sound basis of the population health data before
22 any facility is built, and monitored yearly to show any
23 changes. To say it in simplification, acknowledge the
24 effects on the living, preferably younger children, and
25 take corrective actions, even if someone must accept



1 liability. This must be done by a group without a
2 vested interest in the nuclear industry or the atomic
3 energy.

4 In closing, I would like to thank you for
5 the opportunity of forwarding my views and opinions as a
6 conscientious person. As I have lived in Port Hope all
7 my life, I have observed man's handling of nuclear waste
8 at firsthand because of lack of knowledge in the early
9 years of this industry. Do we really want a repeat of
10 this problem, when we do know the possible consequences
11 of using the out-of-sight, out-of-mind theory, which
12 could be very dangerous and costly to our future
13 generations?

14 Any questions, I would be pleased to try
15 and answer them.

16 THE CHAIRMAN: Thank you, Mr. Brown.

17 This is a letter, but is being read into
18 the record of these meetings. Are there any questions
19 which panel members wish to put to Mr. Brown?

20 It sounds as if your letter speaks clearly
21 its points of view.

22 MR. BROWN: Thank you very much, sir.

23 THE CHAIRMAN: Thank you very much, Mr.
24 Brown.

25 ---Mr. Brown withdraws.



1 THE CHAIRMAN: Any final requests I have,
2 so far, in any event, is from Mr. Gordon Turnbull, as to
3 address the meeting.

4 PRESENTATION BY MR. TURNBULL:

5 Thank you, Mr. Chairman and Panel Members,
6 for allowing me to speak. I'm speaking strictly as a
7 private citizen who is concerned about the future of our
8 children and about the enormous costs associated with
9 this undertaking.

10 In addition, I decided it is time for once
11 not to be a couch potato and to get out some here
12 tonight and express my feelings. Unfortunately I didn't
13 find out about this until super time tonight, so I
14 haven't had a whole lot of time. Most of it was notes I
15 wrote on the subway getting to my car.

16 Anyway, first I would like to start by
17 complimenting the federal government for the excellence
18 of what I have seen of the research, and what I feel is
19 the possible results in the future.

20 I didn't come here tonight, though, to be
21 supportive in the immediate future, because my concern
22 is that at this point in time, I do not feel that an
23 enormous expenditure of the billions of dollars is
24 required. I feel that this type of a project can very
25 easily be delayed 50 or possibly 100 years. This is not



1 something that is needed to be done now.

2 I feel that we in Canada are reacting to a
3 problem that the nuclear military powers have. In other
4 words, that the United States, France, Germany, Russia
5 have perhaps 20 or 30 times the amount of nuclear waste
6 that we have, and they have a problem.

7 Unfortunately, as I see it, we only have a
8 few thousand tons of waste fuel. I do not consider this
9 a problem. I feel that the quantities are minor. I
10 feel that we live in a country of hundreds or millions
11 of square kilometres, and that the present storage of
12 waste in perhaps half a dozen swimming pools is more
13 than adequate to meet the needs, in my feeling, at least
14 the next 50 years.

15 I went before the Porter Commission ten
16 years ago on this same concern, because at the same time
17 it looked to me like there was a huge empire building,
18 starting up and firing up, and that we were going to be
19 getting into billions of dollars of expenditure. The
20 same concerns were expressed at that time, and obviously
21 you will perceive that it didn't have any affect.

22 At that same inquiry I asked the six, I
23 think there were six, world experts in this subject that
24 Dr. Porter had brought out, if there was a need for
25 under the earth, or if we could not live with storage



1 above ground. In all cases the world experts said that
2 there was no problem in building a facility above ground
3 that adequately could store this waste.

4 I asked, if I wanted to move my family
5 next store to this facility, would I be safe, or would I
6 be getting radioactivity? In all cases those experts
7 said that there would be no danger to my health or my
8 family's health. I am knowledgeable enough in radiation
9 that I feel quite satisfied that this is certainly
10 possible.

11 I think one of the other concerns is that
12 the fuel presently is stored on-site of the operators in
13 this country, and I feel that these pools and these
14 facilities are staffed by very expert people now that
15 are highly trained, highly skilled people, who have a
16 very big interest in proper storage. I feel that the
17 addition of another couple of pools in these facilities
18 over the next 20 or 30 or 40 years is not a major
19 concern, but a couple of swimming pools in a country the
20 size of ours is just totally insignificant.

21 If I remember Dr. Porter's discussions,
22 they were talking about a football field of about four
23 feet deep in waste fuel by the end of the century for
24 all of the nuclear facilities that were and to be built
25 and operated under that time. Now again, to me this is



1 a totally insignificant amount of fuel in a country of
2 our size.

3 One other thing about the storage
4 facilities now is that they are now monitored
5 internationally. There are video cameras that watch the
6 facilities continuously, and that these are looked at or
7 monitored continuously by the -- I can't remember the
8 name of the facility that looks after them, but anyway,
9 it is a United Nations facility that looks after these.

10 I think since I'm suggesting something
11 like this, I want to also suggest that I feel that there
12 is a possibility for some sort of intermediate storage
13 facility should be considered. I can believe that this
14 could very well be on-site at some of the stations. In
15 my mind it would be preferable to have a site remote
16 from the major city centres, like Pickering and
17 Darlington, and moved up to Bruce or in Northern Ontario
18 somewhere, although people in Northern Ontario don't
19 like to hear that.

20 So I'm suggest the two things, I guess.
21 That as far as I'm concerned this whole project should
22 be delayed 50 or 100 years. It is far premature.

23 Second, the intermediate storage
24 facilities.

25 As a little aside here, I just want to say



1 that I just came from a meeting downtown in which Dr.
2 Hare was speaking, and in a question and answer session
3 I asked him point blank, "Would you, if it was your
4 money, would you build a facility now?" And he said no.
5 He said perhaps an intermediate facility should be
6 considered. So he supported my ideas, I think, pretty
7 clearly from what he said.

8 Anyway, I think that is my main points,
9 and I would like to put it together a little bit better
10 and write it as a written submission to you. I'm afraid
11 that a few notes made on the subway and my thoughts over
12 the last few years on the subject -- I have been
13 watching this develop since the Porter Commission days,
14 I have been opposed to it since those days, and I remain
15 in that way.

16 I am not saying that I disagree with this
17 in the long term. Maybe there will be no technology
18 developed, that this will not be needed sometime. But I
19 feel that it is definitely not needed at this time, and
20 the expenditure of something like 10 billion 1990
21 dollars on this kind of a project is a total waste of
22 the public's money, mine included, at this point in
23 time.

24 Thank you very much for hearing me. I
25 appreciate it.



1 THE CHAIRMAN: Thank you very much. I
2 think you have made your point very clearly, but we of
3 course would appreciate receiving from you a letter, if
4 you'd like to spell that out a little bit more
5 systematically than you were able to do from the notes
6 today.

7 Are there any questions from panel
8 members?

9 DR. WILSON: I am a little puzzled. I
10 know you were on the subway and all that. But I'm a
11 little puzzled, if it is such a minor amount of waste
12 which is being well monitored on the surface, why do you
13 want to move it?

14 MR. TURNBULL: I think I have said pretty
15 clearly that I not feel it is necessary to move it. I
16 feel that facilities are available on-site that are
17 quite adequate.

18 DR. WILSON: But you mentioned Northern
19 Ontario?

20 MR. TURNBULL: No, I said if you are going
21 to move it.

22 DR. WILSON: Oh, I'm sorry, I didn't
23 understand that.

24 MR. TURNBALL: Let me reiterate. I feel
25 very clearly that there are facilities on the sites of



1 all the stations that are quite capable of holding all
2 of the nuclear waste that can be generated certainly in
3 the next 50 years.

4 DR. WILSON: Okay, I misunderstood. Thank
5 you.

6 - THE CHAIRMAN: Other points of
7 clarification on the presentation of Mr. Turnbull?

8 If not, thank you very much indeed for
9 appearing here this evening.

10 ---Mr. Turnball withdraws.

11 THE CHAIRMAN: Are there any other members
12 who wish to speak while we are here?

13 If not, I would like to thank you most
14 warmly on behalf of the panel that I chair for turning
15 out this evening, for presenting your views to us, for
16 the care that you have obviously taken in thinking
17 through this difficult problem and letting us know what
18 results you have come to. I assure you that those and
19 comments which we will be receiving as we travel to a
20 number of centres across the country will be of great
21 help to the panel as it wrestles with the task, at least
22 initially, of giving guidelines to AECL.

23 Thank you very much. I close this session
24 now and with our repeated thanks to you. Thank you.

25 ---Whereupon the hearing was adjourned at 9:40 p.m.



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I hereby certify the foregoing to be
a true and accurate computerized
transcription of the proceedings, to
the best of my skill and ability.

Robin Tokarz

Robin M. Tokarz, C.S.R.

